JOURNAL

OF

THE FRANKLIN INSTITUTE

OF THE STATE OF PENNSYLVANIA

FOR THE

PROMOTION OF THE MECHANIC ARTS.

JULY, 1848.

CIVIL ENGINEERING.

Strength of Materials for Railway Bridges.

The president of the Royal Scottish Society of Arts, (G. Buchanan, Esq.,) at the request of the council, presented an important communication, at their last meeting, entitled—"An Exposition on the Strength of Materials, particularly, Cast Iron and Malleable Iron, and their Application in the Construction of Railway Bridges."

Mr. Buchanan commenced by stating, that he did not profess to communicate anything original, but would be happy if he could only draw from the stores of information which had of late years been accumulating on this subject under the hands of very eminent, scientific, and practical men, such leading facts and maxims as might prove a sure guide for our practice; and such truths, when they become known and established on the unerring grounds of experiment and calculation, could not, he thought, be too widely disseminated. The various strains might all be reduced to two kinds, according as the material is either distended or compressed by any force or pressure. From these two all others arise, and either consist or are compounded of them.—The tensile strain is the simplest of all, depending neither on the peculiar form of the materials, nor even on the length, but only on a single element—namely, the section of fracture. This peculiarity of the tensile force was explained and illustrated. In regard to cast iron, the result of the extensive and interesting experiments of Messrs. Hodgkinson and Fairbairn was given; and it was found from the mean of 16 different trials of English, Welsh, and Scotch iron, both hot and cold blast, that this material will sustain about 7½ tons per square inch before breaking, the weakest specimen being 6, and the strongest 9¾.

The limit of fracture, however, can never be approached with safety, not even within a long distance, seeing that this material is liable to unseen imperfections, and, above all, to snap in a moment, without distending itself, or giving any warning of danger. Malleable iron, again, is much superior in tensile strength, and, by its remarkable ductility, inspires confidence in a still higher degree; bears no less, at an average, by various experiments of Telford and Brown, than 27 tons —the weakest 24, and the strongest 29 tons; but, before the half of this load is applied, it begins to stretch, and continues stretching up to the limit of fracture; it is, therefore, not only three times stronger than cast-iron, but may be safely loaded with five times the breaking weight, or about 8 or 9 tons. In regard to the strength of compression, this depends also, as long as the length is limited, on the same element—the section of fracture; but when a long rod or slender pillar is loaded or compressed, it is liable to bend, not for want of strength, but for want of stability, the least flexure turning it off its centre, and breaking it by lateral force—deranging entirely the simple law applicable to short lengths. In regard to cast-iron, by far the most satisfactory experiments are those by Hodgkinson and Fairbairn. The mean result gives very nearly 50 tons on the square inch—the weakest 36½ tons, and the strongest 60 tons. It is thus six times stronger in compression than in distension; and hence it is peculiarly recommended for sustaining any superincumbent weight, as in the case of pillars and of bridges, provided the construction is such as to resolve the strain arising from the load into a longitudinal compression. This is often in our power by proper arrangements, chiefly giving a sufficient height and curvature to the arch; but in cases where, for the want of headroom, the arch is unduly flattened, or resolved into a straight beam or girder, the danger is that we bring the tensile force into play, and then the use of cast-iron is objectionable, or, at least, requires extreme caution. No direct experiments have been made on malleable iron of short lengths; but from some facts brought out by Mr. Hodgkinson, its strength appears much inferior to cast-iron, chiefly from ductility, whereby it gives way much sooner under a load. It will bear 27 tons, probably much more, without fracture; but with 12 tons it yields to the load, contracts longitudinally, and swells out laterally; and this is another very important fact for our guidance in the use of those different materials. In regard to stone, experiments have been generally made on specimens rather too minute. Like cast-iron, the crushing strength is superior to the tensile, and hence its adaptation for buildings, particularly bridges. Craigleith stone will bear 2½ tons on the inch, or upwards of 400 tons on the square foot—Aberdeen granite 600 tons. In regard to bricks, he had occasion to make experiments in relation to the great chimney of the Edinburgh Gas Works. It became matter of consideration, whether the ordinary brick could withstand the pressure of so lofty a column. Trials were, therefore, made with a powerful hydrostatic press, not on small specimens, but on the actual brick. The ordinary stock brick was found to bear 140 tons on the square foot, and the common fire-brick 157 tons; but the brick of which the chimney is constructed, consisting of a mixture of fire-

clay and ironstone, bore, a single brick on its bed, no less than 140 tons, equal to 400 tons on the square foot.

The effect of the transverse strain was then considered, and illustrated by various experiments and models. The strain is a compound of the tensile and compressive strain, the one part of a beam loaded in the middle being compressed, and the other distended, and the beam itself becoming a lever, and acting often with enormous power against its own strength. Hence it became easy to calculate the strength, this being in every case proportional, in the first instance, to the area of the section of fracture, and this original element, modified by the length and depth of the beam, diminishing in exact proportion to the length, and increasing in proportion to the depth.

The transverse strain acting with such severe advantage against our materials, various methods have been contrived for eluding its effects; and for these none is more remarkable than the principle of the arch, the effect of which was illustrated by experiments, and particularly the necessity in flat arches of having secure abutments to resist the horizontal thrust—and this was frequently accomplished, where there is sufficient headroom, by uniting the extremities of the arch by strong malleable iron rods, in the same manner as in the case of the roof; the feet of the rafters are united and prevented from spreading by the tie beams; and this is the principle, the securest of all, on which the great iron bridge at Newcastle, now in progress, is constructed—the object of which is to cross the river and valley of the Tyne, on the highest level of the railways on each side, so as to unite them in one uninterrupted line from London to Berwick, and unite the termini of the different railways, now separated three quarters of a mile or more, into one grand central station, a little to the west of the ancient castle. The distance between this station and the present terminus of the York and Newcastle Railway is 3457 feet, consisting chiefly of the space occupied by the bed of the river Tyne, and the steep bank on each side, well known to travelers in descending from Gateshead Fell on the south, and Dean street on the north, both to be now superseded by the smooth and level surface of the railway, and by a turnpike road running on the same bridge directly under the line of rails. The steep banks on each side are spanned by stone arches of a very substantial character, the river and low banks by six metallic arches, all of the same dimensions and structure, resting on solid piers and lofty columns of masonry. In the bed of the river the piers are laid on very solid foundations of piles and planking, with concrete—many of the piles 40 feet in length, and driven to this depth through hard gravel and sand, till they reach a bed of freestone rock. Nasmyth's celebrated pile driver is in full operation here, and with wonderful effect, and has come most opportunely in aid of the work; driving night and day, at the rate of 60 or 70 strokes a minute, the pile heads often being set on fire by the rapidity and violence of the blows of the ram. Piers laid 2 feet below water mark, and raised about 100 feet to the springing of the arches. The arches consist each of four main ribs of cast-iron, each in five segments, bolted together, and forming one entire arch, 125 feet span, and rising 17 feet 6 inches in the centre, and the level of

the rails on the upper platform 108½ feet above the level of high water-mark of the Tyne. Depth of rib 3 feet 9 inches at the springing, and 3 feet 6 inches at the crown, with flanges 12 inches broad, external ribs 2 inches thickness of metal, internal ribs 3 inches. Total sectional area at the crown 644 square inches, which would bear with safety a load of 5000 or 6000 tons, and would form, with proper abutments, a strong arch in itself; but for the fullest security, and to prevent the possibility of inconvenience of risk from deflection or vibration, or otherwise, each rib is united at the springing by strong malleable iron bars, or ties, 7 inches broad and 1 inch deep, of the best scrap iron, and in all 24 in number. The railway is supported above the arch, and the roadway suspended from beneath, by hollow cast-iron pillars 10 feet apart, and each 14 inches square, through which are passed strong malleable iron circular bars, binding the whole into one stiff and solid mass. The sectional area of the horizontal bars is 168 square inches, which would sustain upwards of 4000 tons without breaking, and 1500 tons with perfect safety, but the whole weight of the bridge will not exceed 700 tons, leaving 800 tons of surplus strength. The railway, which is at the summit level, runs on a level 4 feet above the crown of the arched rib, and is supported in the middle by hollow cast-iron trough girders resting on the top of the pillars 10 feet apart, and united by longitudinal timbers laid with strong planking. The roadway runs nearly on a level with the malleable iron ties, leaving a space of about 20 feet clear headroom. In the whole of the work the utmost pains have been bestowed on materials and workmanship, and in making everything complete, the surfaces, which abut together, being regularly planed or turned, as in machinery; and, from all the arrangements, the most successful results may be anticipated from this bridge. The cost of the ironwork and roadway, by the estimates, comes to £112,000, and the contracts for the bridge and viaducts to above £300,000.—*Scottish Railway Gazette.* Lond. Min. Journ.

The General Railroad Law of the State of New York.

An Act to authorise the formation of Railroad Corporations. [Passed March 27, 1848.]

The People of the State of New York, represented in the Senate and Assembly, do enact as follows:

Section 1. Any number of persons, not less than twenty-five, being subscribers to the stock of any contemplated railroad, may be formed into a corporation for the purpose of constructing, owning, and maintaining such railroad, by complying with the following requirements: When stock to the amount of at least one thousand dollars for every mile of the road so intended to be built, shall be in good faith subscribed, and ten per cent. paid thereon, as hereinafter required, then the said subscribers may elect directors for the said company; and thereupon, they shall severally subscribe articles of association, in which shall be set forth the name of the corporation, the number of years the

same is to continue, which shall not exceed fifty years; the amount of the capital stock of the company, which shall be the actual cost of constructing the road, together with the cost for the right of way, motive power, and every other appurtenance for the completion and running of said road, as nearly as can be estimated by competent engineers; the number of shares of which the said stock shall consist; the number of directors, and their names, to manage the concerns of the company, who shall not be one half in the number of the stockholders, and shall hold their offices until others are elected; the place from and to which the proposed road is to be constructed; and each county into or through which it is intended to pass, and its length as near as may be, and the names of five commissioners to open books of subscription to the stock; each subscriber to such articles of association, shall subscribe thereto his name, place of residence, and the number of shares of stock taken by him in such company. The said articles of association may, on complying with the provisions of the next section, be filed in the office of the Secretary of State, and thereupon the persons who have so subscribed, and all persons who shall, from time to time, become stockholders in such company, shall be a body corporate, by the name specified in such articles, and shall possess the powers and privileges, and be subject to the provisions contained in titles three and four, chapter eighteen, of the first part of the revised statutes.

Sec. 2. Such articles of association shall not be filed in the office of the Secretary of State, until ten per cent. on the amount of the stock subscribed thereto, shall have been actually and in good faith paid in cash, to the directors named in such articles, nor until there is endorsed thereon, or annexed thereto, an affidavit made by at least three of the directors named in such articles, that the amount of stock required by the first section has been subscribed, and that ten per cent. on the amount has actually been paid in.

Sec. 3. A copy of any articles of association filed in pursuance of this act, with a copy of the affidavit aforesaid, endorsed thereon, or annexed thereto, and certified to be a copy by the Secretary of this State, or his deputy, shall, in all courts and places, be presumptive evidence of the incorporation of such company, and of the facts therein stated.

Sec. 4. When the certificate shall have been filed as aforesaid, the persons who shall have signed and acknowledged the same, and their successors, shall be a body politic and corporate, by the name stated in such certificate; and shall be capable of suing and being sued, and may have a common seal, and may make and alter the same at pleasure; and be capable in law of purchasing, holding, and conveying any real and personal estate whatever, necessary for the construction of such road, and for the erection of all necessary buildings, yards, and appurtenances for the use of the same.

Sec. 5. The commissioners for opening the books of subscription, named in the act of incorporation, shall, from time to time, after the company shall be incorporated, open books of subscription to the capital stock of the company, in such places, and after giving such notice, as a majority of them shall direct, which books of subscription shall

be kept open until all the capital stock shall be subscribed, if the corporation shall so long exist, and in case a greater amount of stock shall be subscribed than the whole capital stock of such company, the commissioners shall distribute such capital stock as equally as possible, among the subscribers, but no share thereof shall be divided in making such distribution, nor shall a greater number of shares be allotted to any subscriber than such subscriber shall have subscribed for.

Sec. 6. As soon as practicable after such capital stock shall have been subscribed and distributed as aforesaid, the commissioners to receive subscriptions thereto, shall appoint a time and place for the meeting of the stockholders to choose directors. Such meeting shall be held in one of the counties in or through which such railroad is proposed to be constructed; and notice thereof shall be given by said commissioners, by public notice to be published, not less than twenty days previous thereto, in the State paper, and a newspaper published in each county through which the said road shall be intended to run, in which a newspaper shall be published. Thirteen directors shall be chosen at such meeting, by ballot, and by a majority of the votes of the stockholders, being citizens of the United States, and being present in person or by proxy; and every such stockholder, being so present at such election, or at any subsequent election of directors, shall be entitled to give one vote for every share of stock which he shall have owned for the thirty days next preceding such election; but no stockholder shall vote at any such election, upon any stock, except such as he shall have owned for such thirty days. No person shall be a director, unless he shall be a stockholder, owning stock absolutely and in his own right, and qualified to vote for directors at the election at which he shall be chosen, nor unless he shall be a citizen and resident of this State; and at least seven of the directors shall, at the time of their election, be residents of the counties in or through which the route of such railroad shall run. The directors shall be directors for one year, and till others are elected in their places.

Sec. 7. The commissioners named in the last preceding section, shall be inspectors of the first election of directors, shall openly count the votes, and declare the results, and shall, within ten days thereafter, file a certificate thereof, subscribed by them, or a majority of them, in the office of the Secretary of State, and in the office of the clerk of each county, in or through which such railroad shall be proposed to be constructed, and shall also deliver to the treasurer of such company all moneys received by such commissioners, on subscriptions to such capital stock, and all books and papers in their possession, relating to such subscriptions. All subsequent elections shall be held at such time and place, in one of the counties through which such railroad shall pass, as shall be directed by the by-laws of the company, and the provisions of the second article of the second title of the eighteenth chapter of the first part of the revised statutes shall apply to corporations formed under this act.

Sec. 8. In case it shall happen at any time, that an election of directors shall not be made on the day designated by the by-laws of said company, when it ought to have been made, the company, for that

reason, shall not be dissolved, if, within ninety days thereafter, they shall hold an election for directors, in such manner as shall be provided for by the said by-laws. There shall be a president of the company, who shall be chosen by and from the directors, and also such subordinate officers as the company, by its by-laws, may designate, who may be elected or appointed, and required to give such security for the faithful performance of the duties of their office, as the company, by its by-laws, may require.

Sec. 9. It shall be lawful for the directors to call in, and demand from the stockholders respectively, all sums of money by them subscribed, at such times, and in such payments or instalments, as the directors shall deem proper, under the penalty of forfeiting the shares of stock subscribed for, and all previous payments made thereon, if payment shall not be made by the stockholders within sixty days after a personal demand or notice requiring such payment, shall have been published, for six successive weeks, in a newspaper published in each county through which said road shall be laid out, in which a newspaper shall be published.

Sec. 10. The directors of such company shall have power to make by-laws for the management and disposition of stock, property, and business affairs of such company, not inconsistent with the laws of this State, and prescribing the duties of officers, artificers, and servants, that may be employed, for the appointment of all officers, and for carrying on all the business within the objects and purposes of such company.

Sec. 11. The stock of such company shall be deemed personal estate, and shall be transferable in the manner prescribed by the by-laws of the company; but no shares shall be transferable until all previous calls thereon shall have been fully paid in, or the said shares shall have been declared forfeited for the non-payment of calls thereon. And it shall not be lawful for such company to use any of their funds in the purchase of any stock in their own, or in any other corporation.

Sec. 12. All the stockholders of any such company that shall be hereafter incorporated under this act, shall be severally individually liable to the creditors of such company, to an amount equal to the amount of stock held by them respectively, for all debts and contracts made by such company, until the whole amount of the capital stock, fixed and limited by the company, in manner aforesaid, shall have been paid in, and a certificate thereof shall have been made and recorded as prescribed in the following section; and shall be jointly and severally liable for all debts that may be due and owing to all their laborers, servants, and apprentices, for services performed for such corporation, but shall not be liable to an action therefor, before an execution shall be returned unsatisfied in whole or in part against the corporation, and then the amount due on said execution shall be the amount recoverable with costs against said stockholders. The corporation shall require sufficient security from the contractors, for the payment for all labor performed in constructing said road, by persons in their employ. All railroad companies in this State shall be liable to the day laborers employed by contractors, for labor actually performed

on their respective roads, but such liability shall not exist, unless the persons having such claim, shall, within thirty five days after the performance of such labor, notify the engineer in charge of the section on which the labor was performed, that he or they have not been paid by the contractors.

Sec. 13. The president and a majority of the directors, within thirty days after the payment of the last instalment of the capital stock, so fixed and limited by the company, shall make a certificate, stating the amount of the capital so fixed and paid in; which certificate shall be signed by the president and a majority of the directors, and sworn to by the president and secretary; and they shall, within the said thirty days, file and record the same in the office of the Secretary of State.

Sec. 14. If the directors of any such company shall declare and pay any dividend, when the company is insolvent, or any dividend, the payment of which would render it insolvent, they shall be jointly and severally liable for all the debts of the company then existing, and for all that shall be thereafter contracted, so long as they shall respectively remain in office: *Provided,* That if any of the directors shall be absent at the time of making the dividend, or shall object thereto, and shall, within thirty days thereafter, or after his return, if absent, file a certificate of their absence or objection, in writing, with the clerk of the company, and with the clerk of the county in which the principal office of said company is located, they shall be exempt from the said liability.

Sec. 15. If any certificate or report made, or public notice given, by the officers of any such company, in pursuance of the provisions of this act, shall be false in any material representation, all the officers who shall have signed the same, shall be jointly and severally liable for all the debts of the company, contracted while they are stockholders or officers thereof.

Sec. 16. No person, holding stock in any such company, as executor, administrator, guardian, or trustee, and no person holding such stock as collateral security, shall be personally subject to any liability as stockholders of such company; but the person pledging such stock shall be considered as holding the same, and shall be liable as a stockholder accordingly, and the estates and funds in the hands of such executor, administrator, guardian, or trustee, shall be liable in like manner, and to the same extent, as the testator or intestate, or the ward or persons interested in such trust-fund, would have been, if he had been living and competent to act, and held the same stock in his own name.

Sec. 17. Every such executor, administrator, guardian, or trustee, shall represent the share of stock in his hands, at all meetings of the company, and may vote accordingly as a stockholder; and every person who shall pledge his stock, as aforesaid, may, nevertheless, represent the same at all such meetings, and may vote accordingly as a stockholder.

Sec. 18. Every such company, before proceeding to construct any part of their road, into or through any county named in their certificate of association, shall make a map and profile of the route intended

to be adopted by such company, which shall be certified by a majority of the directors, and filed in the office of the county clerk of such county, for the inspection and examination of all parties interested therein, and shall also deposit five per cent. on the capital stock subscribed, with the Comptroller of this State, for the use of said company, to be applied in the payment of any awards of the commissioners, appointed to ascertain the compensation for lands, real estate, or property, taken for said road, and to be paid on the order of such commissioners.

Sec. 19. Every such corporation shall possess the general powers, and be subject to the general liabilities and restrictions, expressed in the third title of the eighteenth chapter of the first part of the revised statutes, and also the special powers following, that is to say:

1. To cause such examinations and surveys for the proposed railroad to be made, as may be necessary to the selection of the most advantageous route for the railroad; and for such purpose, by their officers, agents, and servants, to enter upon lands or waters of any person, but subject to responsibility for all damages which they shall do thereto.

2. To receive, hold, and take, such voluntary grants and donations of real estate, and other property, as shall be made to it, to aid in the construction, maintenance, and accommodation of such railroad, but the real estate thus received by voluntary grant, shall be held and used for the purposes of such grants only.

3. To purchase, and, by voluntary grants and donations, receive and take, and by its officers, engineers, surveyors, and agents, enter upon, and take possession of, and hold and use all such lands and real estate, and other property, as may be necessary for the construction and maintenance of its railroad, and the stations, depots, and other accommodations, necessary to accomplish the object for which the corporation is created; but not until the compensation to be made therefor, as agreed upon by the parties, or ascertained as hereinafter prescribed, be paid to the owner or owners thereof, or deposited in court, or in bank, as hereinafter directed, unless the consent of such owner be given to enter into such possession; but nothing herein contained shall be held as repealing, or in any way affecting, the act entitled "An act authorising the construction of railroads upon Indian lands," passed May 12, 1836.

4. To lay out its road, not exceeding six rods wide, and to construct the same; and for the purposes of cuttings, embankments, and procuring stone and gravel, may take as much more land, within the limits of its charter, in the manner provided hereinafter, as may be necessary for the proper construction and security of the road.

5. To construct their road across or upon any stream of water, water-course, road, highway, railroad, or canal, which the route of its road shall intersect; but the corporation shall restore the stream or water course, road or highway, thus intersected, to its former state, or in a sufficient manner not to have impaired its usefulness, and be subject to the power vested in the canal commissioners, by the twenty-fourth section of the ninth title of the ninth chapter of the first part of the revised statutes; but nothing in this act contained, shall be con-

strued to authorise the erection of any bridge, or any obstructions across, in, or over any navigable stream.

6. To cross, intersect, join, and unite its railroad with any other railroad before constructed, at any point on its route, and upon the grounds of such other railroad company, with the necessary turn-outs, sidings, and switches, and other conveniences, in furtherance of the objects of its connexions. And every company, whose railroad is, or shall be hereafter, intersected by any new railroad, shall unite with the owners of such new railroad, in forming such intersections and connexions, and grant the facilities aforesaid. And if the two corporations cannot agree upon the amount of compensation to be made therefor, or the points and manner of such crossings and connexions, the same shall be ascertained and determined by commissioners, to be appointed by the court, as is provided hereinafter, in respect to the taking of lands.

7. To take, transport, carry, and convey persons and property on their railroad, by the power and force of steam, of animals, or any mechanical powers, or by any combination of them, and receive tolls or compensation therefor.

8. To erect and maintain all necessary and convenient buildings, stations, depots, and fixtures, and machinery, for the accommodation and use of their passengers, freights, and business, and obtain and hold the lands necessary therefor.

9. To regulate the time and manner in which passengers and property shall be transported, and the tolls and compensation to be paid therefor, but such compensation for any passenger and his ordinary baggage, shall not exceed three cents a mile, unless by special act of the legislature, and shall be subject to alteration, as hereinafter provided.

10. To borrow money to be applied to the construction of their railroad and fixtures, and purchase of engines and cars.

Sec. 20. Any number of persons, not less than thirteen, intending to organize a corporation under the provisions of this act, and every company that may hereafter organize under this act, may present a petition to the legislature, stating the place from and to which they propose to construct their road, and its location and route with reasonable certainty, or that they intend to run the said road on the most direct and eligible route between the points of terminus, and praying the legislature to determine whether the construction of the said proposed road will be of sufficient public use, to justify the taking of private property for the construction of the same; and if the legislature shall determine and decide by law, that such proposed road will be of sufficient public utility to justify the taking of private property for constructing and maintaining such road, under the provisions of this act, then such company, when organized, may enter upon, take possession of, and use all such land, real estate, and property, as may be required for the construction and maintenance of their railroad, and the convenient accommodations appertaining to the same, making compensation in the manner hereafter provided, for all land, real estate, and property, thus taken possession of and used, except such as may be volun-

tarily given to, or purchased at an agreed price by the said corporation. Whenever the said corporation shall not have acquired, by gift or purchase, any land, real estate, or property, so required as aforesaid, or which may be affected by any operation connected with such construction and maintenance, the said corporation may present to the supreme court of the district where the said lands, real estate, or property shall lie, a petition, signed by its attorney or agent, describing with convenient accuracy and certainty, by map or otherwise, the lands, real estate, or property, so required to be taken, or to be affected as aforesaid, setting forth the name and residence of each owner, or other person interested therein as owner, tenant, lessee, or incumbrancer, as far as known to such attorney or agent, or appearing of record; and praying the appointment of commissioners, to ascertain the compensation to be made to such owners and persons interested, for the taking or injuriously affecting such land, real estate, or property, as aforesaid. The court shall have satisfactory evidence that notice of an intended application, and the time and place thereof, for the appointment of commissioners of appraisement between said corporations and the owners and persons interested in such lands, real estate, and property, had been given at least ten days previously, to such owners personally, or to some person of suitable age, at their residences, or on the premises, or by the publication thereof in a newspaper printed in the county in which such land, real estate, or property may lie; such publication to be allowed only in respect to owners who shall appear, by affidavit, to have no residence in the county known to such agent or attorney, whereat such notice could be delivered as aforesaid. The court may adjourn the proceedings from time to time, shall direct any further notice thereof to be given, that may seem proper; shall hear proofs and allegations of all parties interested, touching the regularity of the proceedings, and shall, by an entry in its minutes, appoint five competent and disinterested persons, commissioners, to ascertain such compensation as aforesaid, specifying in such entry a time and place for the first meeting of such commissioners. The said commissioners, before entering upon the duties of their office, shall take the oath prescribed by the twelfth article of the constitution of this State; any one of them may administer oaths to witnesses produced before them, and may adjourn, and may hold meetings for that purpose. Whenever they shall meet to hear proofs or allegations, unless by appointment of the court, or pursuant to adjournment, they shall cause reasonable previous notice of such meetings to be given to the said owners or parties interested, or their attorney or agent, and may each of them issue subpœnas, and compel witnesses to appear and testify. They shall hear the proofs and allegations of the parties, and any three or more of them shall, after viewing the premises, without fear, favor, or partiality, ascertain and certify the compensation proper to be made to the said owners and parties interested, for the land, real estate, and property, so to be taken or injuriously affected, as aforesaid, without any deduction or allowance, on account of any real or supposed benefit or advantage, which such owners or parties interested may derive from the construction of such road; and may, in their discretion, assess

a separate, reasonable sum in favor of such owners and parties interested, or of any person appointed by the court to appear as attorney for them, for costs, expenses, and reasonable counsel fees. They, or a majority of them, shall make, subscribe, and file with the clerk of the county in which such lands, real estate, or property shall lie, a certificate of their said ascertainment and assessment, in which such land, real estate, and property, shall be described by map or otherwise, with convenient accuracy and certainty. The court, upon such certificate, and due proof that such compensation and separate sums, if any be certified, have been paid by the parties entitled to the same, or have been deposited to the credit of such parties in some bank, for that purpose approved by the court, shall make and cause to be entered in its minutes, a rule, describing such lands. real estate, and property, in manner aforesaid, such ascertainment of compensation, with the mode of making it, and such payment or deposite of the same compensation, as aforesaid: a certified copy of which rule shall be recorded and indexed in the proper clerk's or register's office, in the like manner, and with like effect, as if it were a deed or conveyance from the said owners and parties interested to the said corporation. Upon the entry of such rule, the said corporation shall become entitled to use and occupy all lands, real estate, and property described in said rule, as required to be taken as aforesaid, during the continuance of the corporation, by this or any subsequent act; and may take possession of, hold, and use the same for the purposes of said road, and shall thereupon be discharged from all claims for damages, by reason of any matter specified in said petition, certificate, or rule of court. If, at any time after an attempted or actual ascertainment of compensation, under this or any other act, or any purchase by, or donation to, the said corporation, of any lands for the purposes aforesaid, it shall appear that the title, thereby acquired, to all or any part of such lands, for the use of said road, or of said corporation, shall fail or be deemed defective, the said corporation may proceed anew to perfect such title, by procuring an ascertainment of the compensation proper to be made, to any person or persons whose title, claim, or interest in, or lien upon, such lands, shall not have been compensated or extinguished according to law, and by making payment thereof in the manner hereinbefore provided, as near as may be. And at any stage of such new proceedings, or of any proceedings under this act, the court may, by a rule in that behalf made, authorise the said corporation, if already in possession, to continue in the use or possession, and if not in possession, to take possession of, and use such premises, during the pendency, and until the final conclusion of such proceedings: and may stay all actions or proceedings against such corporation on account thereof, provided such corporation shall pay a sufficient sum into court, or give approved security, to pay the compensation in that behalf when ascertained; and in every case where possession shall be so authorised, it shall be lawful for the owner or owners to conduct the proceedings to a conclusion, if the same shall be delayed by the said company.—The said commissioners shall be entitled to receive from said corporation, their reasonable disbursements, and a compensation not exceeding two dollars for

each day actually employed by them in the discharge of their duties; such compensation and disbursements to be taxed and allowed by the court. If any commissioner, so appointed, shall die, be unable or fail to serve, the court may appoint another in his place, on reasonable notice of the application, to be approved by the court. The proceedings hereby authorised, may be had in the supreme court, in a county court where the lands lie, and all motions to the supreme court, for the appointment of commissioners, shall be made at a general or special term thereof, in such county, or in an adjacent county. The said commissioners shall file their said certificate in the county where the lands to be affected may lie, or in any adjacent county, and any clerk shall transfer the same, and proceedings connected therewith, to the clerk of the county in which the land to be affected may lie, or of any county adjacent thereto, whenever such commissioners or clerk shall be so required, by said corporation, its agent, or attorney; provided that nothing in this section contained, shall prevent the present legislature, before adjournment, from acting upon and determining the public use of such proposed railroads, as have been or may be applied for at the present session. **Amer. Min. Journ.**

(To be Continued.)

AMERICAN PATENTS.

List of American Patents which issued in the month of April, 1847, *with Exemplifications, by* CHARLES M. KELLER, *late Chief Examiner of Patents, in the U. S. Patent Office.*

1. For an *Improvement in the Steam Hammer;* Lewis Kirk, Reading, Pennsylvania, April 3.

We make the following extract from the specification:—"The object of my invention is to apply the direct action of a steam piston, to operate the helve or lever of a hammer; and the nature of my invention consists in so combining a steam engine with the helve or lever of a hammer, and between the hammer and fulcrum, that when the steam is let in under the piston it shall lift up the hammer, and when the exhaust valve is opened, the piston will be at liberty to be carried down by the weight of the hammer—the steam and exhaust slide valves being operated each by a separate arm, on the shaft of the helve or lever, and the ends of these two arms being so connected with the valve rods, by slots, which permit the arms to move for some distance before they begin to act on the valves, so that the hammer shall nearly reach the end of its downward motion before the steam valve is opened, to admit steam to produce the next upward motion; and so of the exhaust valve during the upward motion of the hammer, the admission of steam to the steam valve being governed by a slide valve, that commands a steam port in a plate immediately above the steam valve, and operated by hand, by means of which the attendant can start and stop the hammer at any time, and at any portion of its motion. And

my invention also consists in combining with the hammer, thus operated, a slide plate with a port in it, under the steam valve, and a like plate under the exhaust valve; so that the attendant can, by sliding these plates, by a screw or lever, cause either the steam or exhaust valves to open or close, sooner or later, and thus regulate the length of stroke of the hammer."

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the arrangement of the vertical single acting steam engine, substantially as described, when this is combined with the helve or lever of the hammer, by means of the rocker on the cross-head, and the jointed links, substantially as described. I also claim the sliding plates, or regulating valves, below the steam and exhaust valves, in combination with the engine, combined with the hammer helve or lever, substantially as described, whereby the range of motion of the hammer can be increased or decreased by the attendant, at pleasure, as described."

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2. For an *Improvement in Clocks;* Charles Kirk, Bristol, Connecticut, April 3.

The patentee says,—"The nature of my invention consists in using two pallet or scape wheels, in combination with a detached lever and balance. By this arrangement, I am enabled to put my movements into cases of much smaller dimensions, and external motion does not interrupt the time, making them much more convenient than those with a pendulum, and not as liable to be deranged."

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the two pallet or scape wheels, in combination with the detached lever, substantially as set forth."

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3. For *Improvements in Pumps;* William D. Taber, Buffalo, Erie county, New York, April 3.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the employment of a cover to the valves of a pump, by the removal of which the valves will be released, and access had to them, combined with a contrivance that, by the bearing of the cover, may serve to keep the valves in their places,—whether this cover and contrivance for holding the valves be in one or in several parts."

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4. For an *Improvement in Pumps;* Dudley L. Farnam, City of New York, April 3.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the attaching the valves to the lower edge of the apertures in the side of the upper cap, and the end plate of the water-way box, in combination with the flanches that constitute the valve seats, (surrounding the induction and eduction apertures, and fitted within the cap or bonnet and the water-way box,) and with the cap plates, which give access to the valves, substantially as described, whereby the apertures in the side of the upper cap, and the end plate

of the water-way box, answer the double purpose of giving access to the valves, to take them out to repair, &c., and to adjust them to the flanches which constitute their seats, and which are separate from the parts to which the valves are attached as described."

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5. For an *Improvement in Washing Machines;* John Shugert, Elizabeth, Allegheny county, Pennsylvania, and Geo. W. Porter, Philadelphia, Pennsylvania, April 3.

The improvement consists, 1st, In making the back part of the bottom of the box horizontal, instead of a curve, as in the former case, for preventing the clothes from following the dasher, on its return from the clothes, and causing them to turn in the water with greater facility. 2d, In arranging a series of rollers on a segment of a circle, at the back part of the box, for lessening the friction and pressure on the clothes; and, 3d, In the addition of a wringing apparatus, for partially drying the clothes after being washed: the whole being arranged and combined in such a manner, as to but slightly increase the expense and proportions of the former machine.

Claim.—"What we claim as our invention, and which we desire to secure by letters patent, is arranging the rollers in the back part of the box, in the form of a segment of a circle—the lower one being on a line with the upper, in the manner and for the purpose set forth, in combination with the abrupt edge or rest, formed on the bottom of the box, for preventing the clothes from following the dasher, on its return, and causing them gradually to turn at each succeeding stroke, as described."

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6. For *Improvements in Machinery for Making Type;* Jean Constant Petyt, Paris, France, (patented in France, May 15, 1845,) April 3.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the combination of the lateral dies with the punches and letter dies, arranged and operating substantially as described."

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7. For an *Improvement in Threshing Grain;* Edmund L. Dozier, Camden county, North Carolina, April 3.

Claim.—"What I claim as new, and desire to secure by letters patent, is the revolving drum, or cylinder, in combination with the reel, arranged and operated in the manner, and for the purpose set forth and described."

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8. For *Improvements in constructing and arranging the Slide Valves and Steam Ways of Locomotives and other Steam Engines;* John D. Beers, Philadelphia, Pennsylvania, April 3.

Claim.—"What I claim as new, and desire to secure by letters patent, is the manner of arranging the respective steam ways, and the cavities in the slides, as set forth, that is to say: I claim the employment of the five openings, or steam cavities, in the valves, in combina-

tion with the three cavities in the slides, and with the tubes connecting the valves, with the valve, under an arrangement of the respective steam passages, as represented, and for the purpose set forth; by which the respective parts thereof are made to operate, and the action of the engine may be reversed, substantially as described; and this I claim, whether the arrangement made be precisely the same with those of which exemplifications are given, or be varied therefrom, whilst the same end is attained by means substantially the same."

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9. For *Improvements in the Hydraulic Ram;* Joshua L. Gatchel, Oxford, Chester county, Pennsylvania, April 3.

Claim.—"What I claim as new, and desire to secure by letters patent, is the employment of the weighted elastic diaphragm, in combination with the descending pipe, leading down into a well or other reservoir of pure water, from which a portion will be raised at every impulse of the ram. I do not claim the use of a flexible diaphragm in apparatus for raising water, but I do claim it as making a part of the combination necessary to the raising, and the preserving unmixed, of the pure water, under the arrangement set forth.

"I also claim, in combination, the particular manner of constructing the impulse valve, with the regulating plate, and the holes bored obliquely through the rim of the valve, in the manner and for the purpose set forth."

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10. For an *Improvement in Sawing Wood;* Reed B. Brown, Williston, Crittenden county, Vermont, April 10.

"The power for actuating the saw is to be derived from a weight that passes over a pulley, and that is to be wound up in a manner to be presently described. The wood to be sawed is to be placed by hand upon a wood-horse, formed in the usual manner, and is to be held down, during the operation of the saw, by means of a weighted lever, made to press on its upper part. In the arrangement of the gearing for operating the saw, there is not any thing that is substantially new, and I do not, therefore, intend to make any claim to this part; but I have added thereto an apparatus for raising the saw, and for arresting the descent of the moving weight, by the falling of the saw frame, when the piece of wood has been separated by the saw, so that the whole remains at rest, until a new stick of wood is placed upon the horse by the attendant. I have also devised a plan to facilitate the winding up of the weight, by the coiling of a rope upon a reel, which coiling takes place whilst the weight is running down; the weight may then be wound up by drawing upon the rope which has been so coiled."

Claim.—"What I claim as new, and desire to secure by letters patent, is the combination of the apparatus for elevating the saw, and arresting the descent of the weight which is to operate as a motive power, the arrangement of the respective parts being substantially the same with that herein described and represented: that is to say, I claim the

combination of the bent lever, tilting shelf, weight, cord, lever and pins, cap piece and lever, with the rod connecting it to the crank."

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11. For an *Improvement in Railroad Brakes;* John Lahaye, Reading, Berks county, Pennsylvania, April 10.

The patentee says,—"The nature of my invention consists in so constructing the brakes, that a reversed motion of the wheels of the car will throw them out of gear, and prevent their acting on the wheels while the cars are moving in a backward direction."

Claim.—"What I claim as new, and desire to secure by letters patent, is the combination and arrangement of the rubbers or brakes, the rubber cases or shoes, joint pieces and bolt, with each other, and with the shaft, cams, lever, bar, and bumper, substantially in the manner and for the purpose herein set forth."

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12. For an *Improvement in Safety Traces;* Eckert Myers, New Holland, Lancaster county, Pennsylvania, April 10.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is adjusting the traces to suit the size of the horse, by means of shifting the metallic plates and bolts in the manner described.

"I also claim, in combination, the rings to which the harness is attached with the spring bolt and cord, arranged and operated in the manner, and for the purpose herein set forth."

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13. For an *Improvement in the Exhaust Pipe of Locomotive Engines;* Ross Winans, Baltimore, Maryland, April 10.

Claim.—"What I claim as new, and desire to secure by letters patent, is the diminution of each of the openings of the exhaust pipes of a locomotive engine, with two cylinders, while the engine is in motion, at the pleasure of the engine man, and where the exhaust pipes discharge themselves through a mouth-piece or pipe common to both, while the orifice of such common pipe or mouth-piece is, at the same time, diminished to the same or similar extent, for the purpose above set forth.

"I do not claim the diminution of the orifice of the pipe common to both exhaust pipes, or the diminution of the orifices of pipes where they discharge their steam separately into the chimney, for a patent for such an invention has already been granted to me; but I do claim the diminution of the orifice of the common pipe or mouth piece, in combination with the diminution, at the same time, of the openings of the two exhaust pipes, before they are united in the common pipe.

"I also claim as new, the mode of doing this, by the use of the wedge-shaped plates, hereinbefore described, acting in the manner described."

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14. For an *Improvement in Padlocks;* Benjamin Chambers, (assignor of Joanna Chambers,) Washington, D. C., April 10.

Claim.—"What I claim as new, and desire to secure by letters pat-

ent, is the manner in which I have combined and arranged the levers, or either of them, and the lever, the former within the body of the lock, and the latter within the barrel of the key, so as to be operated on the slide of the key, in the manner described, which slide liberates the catches from the hasp of the lock, as set forth; the whole combination and arrangement being the same with that fully made known. And this I claim, whether the respective parts be made precisely in the forms represented and described, or in any other that constitutes a lock and key, that are substantially the same in their principle of action, effecting the same end by means essentially the same."

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15. For an *Improvement in Hinges;* Thomas Peck, Syracuse, New York, April 10.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the combination of the curved adjustable inclined plane, of the form set forth, secured to the casing, with the arms, and roller, attached to the door, substantially in the manner set forth, for the purpose of closing the door when left ajar, retaining it when closed, and also retaining the same when thrown wide open, in the manner described."

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16. For an *Improvement in Reciprocating Saw Mills;* Jacob Kunsman, Reading, Pennsylvania, April 10.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the combination of the rollers, attached to the feeding hand, and the chain or inclined plane, arranged in the manner, and for the purpose above specified."

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17. For an *Improvement in Bedstead Fastenings;* Daniel Ball, Albany, New York, April 10.

The patentee says,—"The nature of my invention consists in constructing a cheap fastening, that can be readily applied, and permits the bedstead to be easily taken down or set up, while, at the same time, it binds the rails firmly to the posts, making a close and permanent joint, and preventing a harbor for bugs, &c."

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the combination of the corner or angle iron, and wedge, for fastening bedsteads, substantially in the manner and for the purpose set forth."

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18. For an *Improvement in an Apparatus for Closing Doors, Gates, &c.;* Daniel Ball, Albany, New York, April 10.

The purpose of this invention, we are told, is that of raising doors, gates, and blinds upon their hinges, as they are opened, and afterwards closing them; and also that of holding them open if desired.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the application of the rod and sockets, or fastenings,

as described, to doors, gates, and blinds, in such a manner that, when one socket is fastened to the door, gate, or blind, and the other to the casing, the rod will stand obliquely across the joint, for the purpose and substantially as described."

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19. For an *Improvement in Hinges;* Wendell Wright, Cincinnati, Hamilton county, Ohio, April 10.

Claim.—"What I claim as new, and desire to secure by letters patent, is the within described combination of apparatus for the uniting to the office of hinge, those of the manipulation of the shutter, when the sash is closed, by arrangement of spiral, and the connecting lever with its appurtenances of link, screw-handle, &c., after the manner or principle fully described."

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20. For an *Improvement in Lasting Boots and Shoes;* Benjamin Livermore and Nathan F. English, Hartland, Windsor county, Vermont, April 17.

Claim.—"What we claim as our invention, and desire to secure by letters patent, is the adjustable frame for lasting boots and shoes, consisting of the sliding adjustable plates, and the frame upon which they slide, and, in combination therewith, the adjusting spring and cross-piece attached thereto; the whole being operated and employed substantially in the manner described."

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21. For an *Improvement in Printing Certain Colors on Calicoes, &c.;* Bennet Woodcroft, Manchester, England, (English patent dated June 22d, 1846,) April 17.

"My invention," says the patentee, "consists in the application of an improved gas apparatus to a calico printing machine, which apparatus contains the artificial atmosphere or gas, deprived of, or devoid of, free oxygen, with which the whole room has heretofore been filled, in which the operations have been carried on, and which apparatus is made to deliver or distribute the said gas on the color used on the fabric, (whilst it is being printed with de-oxydized indigo, to produce a blue color, or with de-oxydized indigo, combined with other materials, to produce other colors,) wherever it is desirable to displace the atmospheric air, or to prevent its injurious action on the color or fabric, without involving the necessity of placing the printing machine, the fabric to be printed, the printing materials, and the workmen, in a room or chamber filled with the artificial air or gas, as heretofore practised."

Claim.—"Having thus described the nature of my said invention, and the best means I am acquainted with for performing the same, I would observe that other arrangements of printing machinery may be used; and that I do not confine myself to the exact details of the gas apparatus, herein shown and described, which may be either attached to, or detached from, the printing machine, and also that any other

suitable artificial atmosphere, which is devoid of, or deprived of, free oxygen, may be used in place of coal gas, for filling the chamber, and thereby displacing and excluding atmospheric air, during such parts of the process of printing, in such colors as aforesaid, as may be desirable.

"But what I claim as my invention, is such an application of gas apparatus to calico printing machinery, for producing the colors I have named, as will cause coal gas, or any other suitable gas, deprived of, or devoid of, free oxygen, to be delivered or distributed upon the color, and the fabric, under operation in manner aforesaid, to the exclusion or displacement of atmospheric air, so as to prevent the injurious effects, arising from the presence of oxygen, at certain parts of the process, without exposing any part of the printing machine, or fabric, to the action of the gas, except where its presence is actually useful to the production of the effect required, and without the necessity of the workmen employed, performing their operations in a room or chamber filled with such gas as aforesaid, which has been the case heretofore."

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22. For an *Improvement in Shaping Hats;* Francis Degen, City of New York, April 17.

Claim.—"I claim the placing a changeable heater in the space of the stand, to act in conjunction with a curling cloth, above the heating apparatus, in combination with the adjustable curler or former piece, and the means of holding that in place, for use, substantially as described and shewn."

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23. For an *Improvement in Hinges;* Oliver Judd, Cherry Valley, Otsego county, New York, April 17.

We are told in the specification, that, "By this improvement, the hinges are made stronger, with the same weight of metal, and are fastened more firmly to the wood, and with less trouble, than in the common way, with screws, and the expense of the screws saved."

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the fashion or form of the wings of the hinges, by forming tenons at the ends of the wings, and making a crook or bend in the said wings, so that the tenons are fastened, with a wedge or key, into mortices made in the edge of the doors and door casing, the other part of the wings resting in notches or channels, cut from the said mortices to the face of the door, and the said door casing, as herein described."

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24. For an *Improvement in Compressing Cotton Bales*; Augustus Devall, New Orleans, Louisiana, April 17.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the application of equilateral triangular levers, in combination with ordinary levers of the second order, the latter to be operated upon by direct application of steam power, for the purpose of compressing cotton bales, in such a manner that the increase of power,

by means of the combination, shall be equal to the increased resistance of the bale cotton, undergoing the pressure necessary to reduce it to as small a compass as may be required."

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25. For an *Improvement in Bearings for Axles and Wheels;* Uriah A. Boyden, Boston, Massachusetts, April 17.

The patentee says,—"The nature of my invention consists in sustaining axles, shafts, or spindles, and whatever else may press them downwards or longitudinally, by a bearing which can lean or incline freely in every direction, so as to adjust itself to any position or inclination of the shaft, and thereby prevent any binding of the bearing, and to secure the resting of the axle on a sufficiently large surface to prevent rapid wearing."

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the method of sustaining axles, shafts, and spindles, and whatever else may press them downwards or longitudinally, by means of the self-adjusting bearing, consisting of the first, second, and third links, as above described, whether the third link be movable or adjustable, laterally on, or in respect to whatever it rests upon, or not; and whether the first link be movable or adjustable, laterally on, or in respect to the second link, or not; and whether the second link be movable or adjustable, laterally on, or in respect to the third link, or not.

"I do not confine my claim precisely to the forms described above, but I extend it to all forms which are essentially the same in character, principle, and operation."

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26. For an *Improvement in preparing and compounding Caoutchouc or India Rubber;* William F. Ely, New York, April 17.

"My improvement," says the patentee, "consists in the treatment of the compound of calcined magnesia, or the carbonate of magnesia, and india rubber, by submitting the compound thus formed, to the action of heat or steam, at a regular temperature, by which exposure of such compound to heat, it will be so far altered in its qualities, as not to become softened by the action of the sun, or of artificial heat, nor will it be injuriously affected by exposure to cold. It will lose the adhesiveness of india rubber; it will also, in a great degree, resist the action of all the known solvents of rubber."

Claim.—"Having thus fully described the nature of the process by which I prepare my improved india rubber fabric, I do hereby declare that I do not claim the use of sulphur, as a drier, or used for the purposes above declared, nor of the application of artificial heat or steam, nor simply the compound of magnesia and rubber, but I do claim the combination of calcined magnesia, or the carbonate of magnesia, with india rubber, when the fabric is cured by the heating process, and in combination therewith, so as to form a new fabric, with a compound, either in the proportions above named, or in any other, within such limits as will produce a like result."

27. For an *Improvement in Saw Mills;* P. G. Gardiner, City of New York, April 17.

The patentee says,—"The nature of my invention consists in operating the saw, when hung and strained, in a frame or gate, by means of two cranks, at top and bottom, so that it shall gradually approach and cut into the wood, during one half of the downward stroke, and then draw back, to discharge the saw-dust from the teeth of the saw, and permit the carriage to feed or move the log forward, preparatory to the next cut."

Claim.—"What I claim as my invention, and desire to secure by letters patent, is hanging the saw gate, in which a saw or saws can be strained, in the usual or any desired manner, to the cranks of two crank shafts, one at each end of the gate, substantially in the manner, and for the purpose specified; whereby the saw receives a motion which causes each tooth to generate a perfect circle, to give a more effective cut, discharge the saw-dust, and relieve itself for a repetition of the cut, more effectively than by any other plan with which I am acquainted."

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28. For an *Improvement in Pumps;* Geo. Page, Washington, D. C., April 17.

The patentee says,—"The nature of my invention consists in constructing a cheap and durable pump, by so arranging the parts as to be able to form the pump out of a plane scantling, grooved on one side, and covered with a plain board, and forming a suitable box thereto that shall keep perfectly packed."

Claim.—"Having thus fully described the construction of my improved pump, what I claim therein as new, and desire to secure by letters patent, is constructing the piston and packing as described, so as to cause it to pack out to the square corners, as described, while working either way, without any accurate fittings as set forth."

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29. For an *Improvement in Folding Hinge Bedsteads;* T. B. Blecker, New York, April 17.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the employment of a frame, hinged in the centre, and joined to the two ends of a bedstead, by irons in the shape of hooks, operating as hinges on the bolts attached to the posts, for the purpose of folding the whole bedstead together, endwise, in the manner described."

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30. For an *Improvement in Breaking Hemp and Flax;* Richard J. Gatling, Murfreesborough, Hertford county, North Carolina, April 17.

We extract from the specification the following:—"The nature of my invention and improvement consists in arranging in parallel lines, two, three, six, nine, or more, cast iron or wrought iron plates, one-

half of said plates being stationary, and one-half movable—the former being secured in a permanent frame, and the latter being attached, by a stock and connecting rod, to a revolving crank of a horizontal or other shaft, and caused to move back and forth between the stationary plates, which are arranged with their lower edges nearer together than their upper edges, for the purpose of breaking the hemp finer, as it descends in semi-circular, semi-oval or U-shaped, or other shaped spaces, notches, or cavities, or depressions, made in the upper edges of the said stationary and movable plates,—said notches or depressions being all in a straight line, transversely, when the machine is at rest, forming a transverse, semi-oval, semi-circular, or rectangular rack, with longitudinal spaces between the plates composing said racks, that gradually decrease in width from the upper to the under side, for the purpose of breaking the hemp in finer breaks, as it descends through the semi-oval rack, or square space. The bundle of unbroken hemp, to be operated on, being laid transversely in the said semi-oval rack, at the upper or wider portion thereof, and the crank shaft turned a semi-revolution, will cause the movable rack to carry the hemp against one side of the stationary rack, where the plates composing it are wider apart, and where the hemp will be broken coarsely, which is necessary at the commencement of the breaking operation; and then, by turning the crank shaft another half revolution, the motion of the sliding breakers will carry the hemp to the opposite side of the stationary rack, and break it in an opposite direction, and by repeating the operation, by a continuous revolving motion of the crank shaft, and a simultaneous descent of the hemp, it will be broken effectually to the degree of fineness required—the attendant having only to hold the bundle of hemp in the semi-oval spaces of the sliding breakers, and change the position of the same, horizontally and transversely, and vertically, during the movement, back and forth, of the breakers, when it will be seen, that the hemp will receive two breaks at each revolution of the crank, and that the machine can be operated with very little power, particularly when anti-friction rollers are placed under the sliding plates for them to move over. The hemp is then turned over to a set of revolving beaters, which knock off the broken hurds, and then applied to a series of revolving teeth, which hackle it: said beaters and teeth being fixed in the convex surface of a revolving cylinder, turned by an endless band, connected to the revolving crank shaft, or fly wheel."

Claim.—"What I claim, and desire to secure by letters patent, is the combination of the open bow or U-shaped sliding breakers or beaters, with the stationary beaters, constructed, arranged, and operated in the manner, and for the purpose above set forth—the space in which the flax or hemp is broken being open at top, and gradually lessening in size, longitudinally and transversely, as it descends, for the purpose of breaking the hemp or flax finer, as it is suffered to descend by the operator."

31. For an *Improvement in Mill Stone Drivers;* Joseph McConnell, New Brighton, Beaver county, Pennsylvania, April 17.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the construction of a driver, made in two pieces, attached to each other by a sliding dovetail or feather, which, while one piece is firmly attached to the spindle, the other is so constructed as to slide freely endwise, so as to allow the top stone to keep its parallel with the bedstone, whether the spindle is perpendicular with the same or not."

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32. For an *Improvement in Cultivators;* John Paterson, Medina, Orleans county, New York, April 17.

The patentee says,—"The nature of my invention consists in the arrangement of the cultivator teeth, in the following order: two in the front beam, directly front of the wheel, by which arrangement a track is made for the wheels, which lessens the liability of the wheels to be raised by passing over stones, unbroken turf, or lumps of earth, and two teeth in the centre beam, eleven inches from each wheel, which are sufficiently distant from the wheel to prevent anything from wedging between the wheels and teeth, to clog, or obstruct the motion of the wheels, and, with the arrangement of the front teeth, cannot fail to secure a uniform and even cultivation of the soil; the other three teeth are placed in the back rail; this is combined with a pair of sustaining or carrying wheels, the bearing points of which are one foot and nine inches from the outside of the front teeth, at a point on which the frame poises, so that by this arrangement, the team is relieved from any strain or load, to which they might be liable by too great a movement of the beam up and down, as the teeth cut more or less deep. By this arrangement, the necessity for guiding wheels or handles is dispensed with. In all the wheel cultivators which I am acquainted with, the teeth have been between the wheels, and so near as to be liable to clog, and do their work unevenly, in consequence of the wheels passing over obstacles, such as stone, turf, lumps of earth, &c., while they, being outside of the teeth, leave a strip of land uncultivated next to walls, stumps, fences, or ditches, of from one to two feet; all of which objections to other cultivators, are obviated by this arrangement and combination above described. The size of the wheel will allow of its being turned upside down, and drawn as a cart over grounds not to be cultivated."

Claim.—"I claim the arrangement of the cultivator teeth, as herein set forth, when such arrangement is combined with a wheel cultivator, in which the position of the wheels, with reference to the teeth, is such as herein set forth."

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33. For an *Improvement in Cast Iron Car Wheels;* Geo. W. Sizer and Henry Sizer, Springfield, Massachusetts, April 17.

This is for a modification of the double plate wheel, patented on

the 17th of March, 1838, by Truscott, Wolf, & Dougherty, of Columbia, Pennsylvania.

Claim.—"What we claim as our invention, and desire to secure by letters patent, is the casting a car wheel of two plates of metal, of the form herein set forth, united to the rim and hub, the respective plates being concave outwards, curving from hub to rim; the object of which form is to cause the plates to contract uniformly, and to enlarge the space between the same at the weakest point, as the metal cools, after casting, thereby enabling us to allow the core to remain in the wheel till it becomes perfectly cold. (The core remaining in the wheel, causes the same to cool slowly, having the effect to anneal and toughen the metal, as is well known to metallurgists.)

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34. For an *Improvement in Fire Engines;* Franklin Ransom and Dudley L. Farnam, City of New York, April 17.

The nature of this invention, we are informed, consists in arranging the pump and the engine in a horizontal position, with the piston rod extending out through the heads of the cylinder at both ends, and sufficiently far to attach it to the handles by which it is worked, when this is combined with the carriage or body of the engine, so arranged that the men who work the pump can sit, &c., and apply their strength as in the act of rowing, and thus exert much more force than in any other known way.

Claim.—"What we claim as our invention, and desire to secure by letters patent, is arranging the pump in a horizontal position, with the piston rod extending out through both ends of the cylinder, and provided with handles, substantially as described, when this is combined with the seats on the carriage, for the men that work the pump, so that they can work the pump in a manner similar to the act of rowing, substantially as described, whereby they can exert more force and for a greater length of time, than by any other known mode of working an engine."

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35. For an *Improvement in Hinges;* James Stewart, Utica, New York, April 24.

"The object of my invention," says the patentee, "is to fasten window shutters and blinds, when open or closed, without the necessity of opening the window, and to fasten or hold the shutter or blind, when thrown open, near the outer edge thereof, as well as at the hinges, to prevent the fastenings from being broken by the wind, aided by the leverage of the shutter or blind, as is the case when the fastening is at the hinge alone. And the nature of my invention consists in making the faces of the knuckles of the hinges, where the two halves come together, with recesses and projections, so divided and situated relatively to each other, that when the shutters are opened or closed, the projections of the one shall be in the recesses of the other, and vice versa, and when, at any of the intermediate points, that the projections of the one shall rest and turn on the projections of the other, to admit

of the free turning of the hinges to open and close the shutters or blinds, when this is combined with a cam or eccentric, on the outer end of a spindle or arbor, which lies and turns in that leaf of the lower hinge which is attached to the window frame, and which extends from the knuckle of the hinge to the inside of the window, so that, by turning this spindle or arbor, the cam or eccentric on the end of it, shall act on and lift the other half of the hinge, and with it the shutter or blind, that it may be thrown open or closed, by any of the known modes of doing this, from the inside of the window.

"And my invention also consists in combining, with hinges thus constructed, a permanent hook and catch, attached to the wall and outside of the shutter, that may be hooked and unhooked, by the lifting of the shutter, in the manner described above."

Claim.—"What I claim as my invention, and desire to secure by letters patent, is making the faces of the knuckles of the two halves of the hinge with quadrant recesses, in the manner of a clutch, to hold and prevent the shutter from turning, when either open or closed, when this is combined with the cam or eccentric, on the end of a horizontal spindle, that passes through to the inside of the window, substantially as described, whereby the shutter can be fastened and unfastened, without opening the window, as described.

"And I also claim, in combination with a hinge or hinges, constructed as herein described, the hook and catch attached to the wall and shutter, and which hook and unhook, by lifting down the shutter, to clutch and unclutch the hinges, as described."

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36. For an *Improvement in making Metallic Plate Buttons;* Lucien E. Hicks, (assignor of Junius S. Norton,) Middletown, Connecticut, April 24.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the circles, with their punches, pins, cams, legs, and shoes, in combination with the dies, and the feeding slide, in the manner and for the purposes herein described."

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37. For an *Improvement in Hinges;* John Peant, Washington, D. C., April 24.

The patentee says,—"The nature of my improvement consists in affixing a sliding bolt to the hinge, at or near its joint, so constructed as to embrace and sustain both parts of the hinge when open, and thus hold the blind back, without bringing any strain on the pivoting pin, by which its liability to break is obviated, and a perfect, cheap, and compact hinge is formed."

Claim.—"Having thus fully described my improvement, what I claim as new, and desire to secure by letters patent, is the combination of the bolt with the hinge, in the manner described, so that a portion of it enters between the two parts of the hinge at the joint, so as to brace on one side, while the hook on the bolt firmly secures it on

the other side, the whole being constructed substantially in the manner, and for the purpose described."

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38. For an *Improvement in Conveying the Smoke and Sparks from the Smoke Stacks of Furnaces of Engines, and Extinguishing the Sparks;* R. M. Wade, of Summit Point, Jefferson county, Virginia, April 24.

The nature of this invention consists in combining with the ordinary steam engine, a pump, for pumping the smoke and sparks from the smoke chamber, and discharging them below the engine into water, or otherwise, or whenever desired; the piston rod of said pump being connected with the piston rod of the steam cylinder, by a cross head or other suitable means, causing them to work simultaneously, by which arrangement the annoyance and danger arising from the smoke and sparks escaping from the smoke stack, as ordinarily arranged, will be removed.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is pumping the sparks from the smoke box of a locomotive engine, where the sparks are extinguished, or partially so, by the introduction of a portion of the escape steam through the cocks, substantially in the manner, and for the reasons above stated.

"I likewise claim the arrangement of the valve in the smoke stack, as constructed with the short pipe, in combination with the united steam pipes, for preventing the escape of the smoke and sparks during the operation of the pump, and, at the same time, allowing the waste steam to escape through the smoke pipe."

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39. For an *Improvement in Making Hats;* William Selpho, City of New York, April 24.

Claim.—"What I claim as new, and of my own invention, and desire to secure by letters patent, is the making a machine to form hat crowns, by the constructive combination of the platform, staves, and links, with the cylinder, spring, lever, and standard, when applied to such uses, substantially as described and shown."

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40. For an *Improvement in Manufacturing Tin and other Metal Wares;* Lester Smith, Southington, Hartford county, Connecticut, April 24.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the application of a movable gauge, in combination with two or more different thicknesses of wheels, to be attached to the common setting down machine; and by shifting the wheels or rollers, and moving the gauge, the machine is readily adjusted to any required width of seam."

41. For an *Improvement in Metallic Coffins;* Frederick Skiff, New York, April 24.

The patentee says,—"The nature of my invention consists in combining 80 parts of iron, 15 parts of zinc, and 5 parts of crystals of quartz or glass, (or I may use other proportions, producing analogous results,) which combination, when properly fused together, forms a composition or metal which will not deteriorate or oxydize, by exposure to the moisture of the earth, or the action of the atmosphere, and of making a metallic cement, composed of the filings or portions of the above composition, pulverized and mixed with sal ammoniac and water, to the consistence of an ordinary paste, and which cement, when brought in contact with contiguous pieces of said composition or metal, immediately unites the same, and more firmly, and in a shorter period of time, than any other metallic material can be united, in any air tight form, by any other agent or process, and thus rendering said composition, by the process of uniting the same by means of this cement, peculiarly and better adapted to the purpose of coffins and boxes, for the preservation of dead bodies, and other perishable substances, and vegetable matter, than any other known material, means, or process."

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the before described composition of zinc, silex, and iron, and the making and preparing said cement, for the purpose above stated.

"And I also claim making coffins, boxes, or other vessels, of this material, for the purpose of preserving animal or other perishable substances from decay, substantially in the manner set forth; it being understood and admitted, that said compositions are more particularly advantageous and applicable to the purposes in question, and impervious to air."

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42. For an *Improvement in the mode of Gearing, for Changing the Speed of Rollers, &c.;* John Evans and James H. Thompson, Paterson, Passaic county, New Jersey, April 24.

Claim.—"What we claim as our invention, and not previously known in the above described improvement, is the mode or manner of placing several different sized wheels upon a shaft, and by means of catches, dogs, or tumblers, attached inside of the said wheels, or attached to the shaft upon which the wheels revolve, and, by means of flutes, nicks, notches, or grooves, upon the said shaft, or upon the inside of said wheels, so that said wheels are made to slide, or revolve backwards, to permit the driving wheel to slide or pass from one of said wheels to another, thus increasing or diminishing the speed, without breaking teeth, or causing the machinery or gearing to stop while the change of speed is going on."

43. For an *Improvement in Piano Fortes;* Thomas Loud, Philadelphia, Pennsylvania, April 24.

"The nature of my invention," says the patentee, "consists in the inversion of the striking or hammer action. I do this by removing what is commonly called 'the leathered hammer block,' but which I have named 'the striking block,' from the hammer, and placing it below, attaching it either to the key, or to a lever connected with the key, and affixing, by centres, to the hammer, the movable part or front of the jack, which I centre at or about three-eighths of an inch from the centre of the hammer; this I call the 'movable lifter;' it is kept to its place by a spring fastened front, so that when the key is struck, the striking block strikes and raises the movable lifter, which takes, on its centre, the hammer head to the strings, at which point the hammer is relieved, and falls from the strings, by a block striking an inclined plane on the front of the movable lifter, which presses it off, and relieves it from the striking block."

Claim.—"What I claim as my invention, and wish to secure by letters patent, is the inversion of the parts of the grand action, by 1st, The attaching, by centres, the movable lifter or front of the jack, to the hammer block, or hammer butt, without the striking block forming part of the said movable lifter, or of the hammer butt; and, 2d, The placing the striking block, (which, in ordinary grand actions, is a part of the hammer,) below aforesaid movable lifter, in connexion with the key, either in contact with the key, or by a lever connecting it with the same."

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44. For an *Improvement in the mode of Confining Bits to their Stocks;* Manasseh Andrews, Bridgewater, Massachusetts, April 24.

The patentee says,—"In my improvement, the use of springs is entirely superseded, and the confining catch, which engages with the notch on the bit, is cast near the end of a thumb-lever, which is arranged so as to play loosely in a suitable slot in the socket of the stock. Near that end of this lever to which the thumb is applied, is cast an external stud, which works, or fits, into a spiral or inclined slot, formed in a turning collar, which collar is fitted to, and turns on, the socket aforenamed."

Claim.—"What I claim as my invention, and desire to have secured by letters patent, is the mode hereinabove described, of confining a bit to its stock, viz: by means of a thumb-lever, having a catch and stud as described, in combination with a turning collar, having a spiral slot, as set forth, the whole arrangement and operation being substantially as hereinbefore specified."

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45. For an *Improvement in Presses;* Lorenzo Potter, Warren, Trumbull county, Ohio, April 24.

This improvement in the toggle joint lever press, consists in an improved manner of operating the levers, by means of ratchet bridles and hand levers, combined with the toggle joints.

Claim.—"What I claim as new, and desire to secure by letters patent, is the manner of operating and retaining the toggle joint levers, by means of the hand levers, and the ratchet bridles combined with each other, and with the toggle joints, in such a manner that each hand lever acts equally upon both toggle joints, substantially as herein set forth.

"I also claim the combining the toggle joint levers with the platen, through the medium of the conical-sided notched feeding follower, substantially in the manner and for the purpose herein set forth."

List of American Patents which issued in the month of July, 1842, *with Exemplifications, by* CHARLES M. KELLER, *late Chief Examiner of Patents in the U. S. Patent Office.*

1. For an *Improvement in Straw Cutters;* J. W. Webb, Mount Morris, Livingston county, New York, July 2.

Claim.—"What I claim as new, and wish to secure by letters patent, is the manner in which I have combined and arranged the vibrating frame, with its cutting knife, and the lever, with its connecting rods, so as to effect the cutting by their conjoint action, in the manner described. I also claim the special arrangement of the feeding apparatus, consisting of the pall on the vibrating frame, operating upon the ratchet wheel, and its whirl, and upon the whirl upon the gudgeons of the upper feed roller, which rise and fall in the curved slots, in the manner described."

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2. For an *Improvement in Cutting Nails;* Frederick J. Ayres, Roxbury, Norfolk county, Massachusetts, July 2.

Claim.—"Having thus described my improvement, I shall claim the gauge applied to the rear of the cutting knife, in combination with the die, for the purpose of retaining the nail against the adjacent face of the die, when separated from the strip, and whilst being conveyed by the cutting knife, down upon the shelf, and also for holding said nail against said face of the die, until it is received by one of the nippers; the same being constructed and operating substantially as above explained. Also the angular shelf, upon which the nail is deposited by the cutting tool, and sustained by the nipper and griper during the heading operation, in combination with the gauge, and the die, the said angular shelf being formed as above set forth, by which peculiar shape the nail, by reason of its heaviest part resting beyond the shelf, is caused, by the action of gravity, to fall from said shelf on recession of the griper, the whole being constructed and operating substantially in the manner, and on the principles hereinbefore explained."

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3. For an *Improvement in Cooking Stoves;* Moses Bartholomew, Vershire, Orange county, Vermont, July 2.

The patentee says,—"My stove is constructed with two separate

fire chambers or furnaces, which I call the front and rear fire chambers or furnaces, in either of which a fire may be made separately; the rear furnace is further capable of being divided into two, by means of a swinging partition, and thus admitting of a fire being made in one half of the rear furnace or fire chamber, only. I usually employ three boilers or other cooking utensils in my stove, one of them, which may be of a large size, over the front, and two of them over the rear fire chamber. There is not any oven in the body of my stove, but I combine therewith, in the rear of my rear fire chamber, any elevated oven, constructed in a manner very similar to the elevated ovens previously used."

Claim.—"What I claim as new, and desire to secure by letters patent, is the particular manner in which I have combined and arranged the respective parts thereof, as herein set forth, that is to say: I claim the combining of the rear and fore fire chambers, by means of a top plate, furnished with elevated collars, and with flues formed therein, for the passage of heated air from the fore to the rear fire chamber, and to an elevated oven; the rear fire chamber being also provided with a swinging partition, by which it may be divided into two parts, in the manner, and for the purpose described.

"I claim also the manner of constructing an elevated oven, with one of its heads hinged to the exterior case of said oven, by which means the flue space is completely exposed, and may be readily cleaned.—And it is to be distinctly understood, that I do not claim the combining, in one stove, of two separate furnaces, in either of which a fire may be made at pleasure, as in itself new, and as of my invention, this having been previously done, but not under any arrangement of parts similar to that devised by me, and herein set forth; but I limit my claim in such a stove, to the particular manner of combining and adapting the particular parts thereof, substantially in the manner herein made known."

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4. For an *Improvement in Cutting Match Splints;* Chauncey E. Warner, (assignor to John H. Stevens,) City of New York, July 2.

Claim.—"I claim the application, and the use of the cutting cylinder, or cylinders, in combination with the cutting knife, or other instrument operating substantially the same as herein described. 2d, I claim the application and use of the cylinders or cylinder, with a cutting tool, as above set forth, in combination with the said mode, or other mode substantially the same, for the purpose of feeding the wood, when operated upon as herein described. 3d, I claim the application and use of the cutting cylinders, in combination with a stem or shank, having vertical edges, for the purpose of dividing the wood, substantially the same as herein set forth."

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5. For an *Improvement in Telegraphs;* Samuel Frew, Elizabeth, Allegheny county, Pennsylvania, July 2.

The patentee says,—"The nature of my invention consists in a movable wire, or other agent, in a state of tension, so as to be equiva-

lent to a continuous rod without elasticity, extending from one place to another, by the moving of which wire a given space, at one extremity, a movement over an equal space is produced at the other, and, by the use of dials and indices, at the extremities, the simultaneous movement of these indices are made to coincide in their notations, by pointing to the same word, letter, figure, sign, or emblem, in both places at the same moment."

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the use of a wire or other movable medium, extended from one place to another, together with movable dials, or other alterative contrivances, hereinbefore described, or alluded to, by which corresponding notations are made at the same time, on the dials at the termini of the line, by means of words, figures, letters, signs, or emblems, written thereon, at equal spaces, so that the moving of the wire, or other medium, an allotted space, is made to produce accurate, intelligible, and coincident indications at the extremities, comprising under this principle, the different modifications set forth in these specifications, by which combined movements of two or more media are made to result in definite indications of fact, locality, or idea. I claim, too, as original with me, the several systems detailed in these specifications, by which the eye and ear are both notified of a call or other movement. Also the system herein set forth, by which one bell is made to serve for a number of rooms in a hotel, or other establishment. Also the system herein set forth, by which light is produced and extinguished at any given point, by the movement of a wire or other medium."

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6. For an *Improvement in Water Wheels;* A. B. Beckwith, Bath, Steuben county, New York, July 2.

Claim.—"What I claim as my invention, and not previously known, and which I desire to secure by letters patent, is constructing a water wheel in the manner above described, with any desirable number of concave or dished spiral buckets of wood or metal, and combining them with a shaft, each spiral having a separate entrance for water, at the face of the wheel, and discharging it at the sides, using it with or without the conic flanch, and the cylindrical gate, the gate being so constructed that, by raising or lowering it, the quantity of water necessary may be vented at pleasure."

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7. For an *Improvement in Lard Lamps;* Frederick H. Southworth, Washington, D. C., July 2.

The patentee says,—"The nature of my invention and improvement consists in constructing a holder for the wick, of copper, in a peculiar manner, which also acts as a conductor of the heat, and combining it with a central copper conductor, which also serves to hold or anchor the wick, and combining these with a basined cap, for holding a quantity of lard in contact with the lighted part of the wick, to cause the

wick to light speedily, before the main body of the lard or concrete substance can be converted into oil."

Claim.—"What I claim as my invention, and wish to secure by letters patent, is the peculiar form of the wick holders, in combination with the central conductor, constructed and arranged in the manner herein set forth, or in any other manner substantially the same, combined with a glass or other lamp, for burning lard or other concrete substance, to be previously converted into oil, by the conductors of heat, in contact with the flame of the lamp."

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8. For an *Improvement in Saw Mill Gates;* James Hamilton, City of New York, July 2.

Claim.—"What I claim as new, and of my own invention, is, 1st, The mode of connecting the hand gear crank handle and shaft, through the hand gear pinion, chain band, chain band gear, wheels, and guide screws to the guide blocks, and grooved slide ways, and the combination of these parts with the slide pieces and saw slings, for the purpose of enabling the attendant workman to control and direct the lateral movement of the saw, when such mode of connexion and combination is employed to effect either straight or curvilinear sawing, including any merely mechanical variations in the connecting and working parts, which shall be substantially the same in the means employed, and the effects produced. 2d, The mode of mounting the saw in the chops, in combination with the mode of connecting the chops with the slings, by the centre pins, and the combining these parts with the guide lever and fork on the double-slotted bar, for the purpose of enabling the attendant workman to direct the operations of the saw, successively, in any required lines, either straight or curvilinear, substantially as such mode of mounting, connecting, and combining the same is herein described, including such merely mechanical variations as shall be substantially the same, in the means employed, and the effects produced."

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9. For an *Improvement in the Clasp for Pantaloon Straps;* William H. Miller, City of New York, July 8.

Claim.—"What I claim as new and of my own invention, and wish to secure by letters patent, is the forming the loop of the clasp, with the back lip bent or countersunk down, to allow the back of the hook to lie fair, in combination with the mode shown and described, of making the hook with a three-fold turn to fit the loop, whether one or more clasps are used on a strap, such articles being used as attachments for parts of garments, the whole made and operating substantially as described."

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10. For an *Improvement in Tanning Leather;* Abraham Van Pelt, Bedmunster, Somerset county, New Jersey, July 8.

Claim.—"What I claim as my invention, and desire to secure by

letters patent, is the combination of the pliable moving frame, with the pressing rollers, and also with the vat, constructed and arranged substantially as herein described."

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11. For an *Improvement in Bee Hives;* James E. Ross, Mount Sidney, Augusta county, Virginia, July 8.

The patentee says,—"My invention consists in constructing a stand of any convenient size, upon four feet, the rear feet to be from one to six inches longer than the front feet, (varying according to the size of the stand,) so that the stand may have a slanting or sloping position."

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the combination of the stand and the tin plate, (attached to the front of the hive,) with its appurtenances as herein set forth."

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12. For an *Improvement in Water Wheels;* Reuben Rich, Albion, Oswego county, New York, July 8.

The patentee says,—"The nature of my invention consists in receiving the water into the wheel at its periphery from the flume, by a spiral conductor, and discharging it as soon as it passes the buckets; thus giving the full action of the water, and relieving the wheel of its weight, as soon as it passes that point."

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the combination of the wheel, constructed as hereinbefore described, with the spiral conductor, and tube, so as to get the full pressure of the water, while the wheel is relieved of its weight, in the manner and for the purpose set forth."

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13. For an *Improvement in the Construction of Vessels;* Elisha F. Aldrich, City of New York, July 8.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the mode of constructing ships, boats, and other vessels with cases attached to the sides of the same, as described, and in which wheels, wholly or partly immersed, are made to revolve, and by which vessels are propelled."

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14. For an *Improvement in Cooking Stoves;* William Reebe, City of New York, July 8.

Claim.—"I do not claim to have invented any one of the parts employed in this stove, taken separately therefrom, as all have been more or less used for similar purposes in different ways; but what I claim as new and of my own invention, is the combination of the valves with the valves and flues for the purpose of conducting the heat over and under the oven, either to both ovens, or to one oven separately, substantially as their mode of operation is herein described and set forth, as producing a cooking stove that can easily be set in a common fire place."

15. For an *Improvement in Raising Water;* Louis Bunier of France, now residing in Philadelphia, Pennsylvania, July 8.

Claim.—"Having thus fully described the nature of my improvements in the apparatus invented by M. Ravard, for raising water, and shown the operation of the respective parts thereof,—what I claim therein as new, and desire to secure by letters patent, is, first, the combining of the condensing apparatus, as herein described, with the pneumatic apparatus as used by M. Ravard; said condensing apparatus consisting of the reservoir, the condensor, the tube surrounded by the water chest, the exhaust valves and their respective appendages, or other devices equivalent thereto, and producing the same results, by means substantially the same.

"Secondly, I claim in the hydraulic apparatus, the manner of com bining and arranging the two pipes with each other, and with the receiver, and also arranging the respective valves and pipes connected with said receiver, so as to be operated upon by the float, and of combining the whole together in such manner, as that the external air shall be admitted to press upon the column of water to be raised, and effect its ascension in the manner herein fully made known.

"I am aware that air has been admitted into the ascending pipes of pumps, and has been allowed to commingle with the water therein contained, whereby the column has been rendered of less specific gravity, and could, therefore, be raised to a greater height by atmospheric pressure, than in the ordinary lifting pump; but this device has not been applied to any useful purpose, nor does it appear to be capable of such application. It differs also materially from my mode of forcing up a column of water by atmospheric pressure; as in my apparatus it is forced up in an unbroken column, in consequence of its having acquired a momentum in its descent in the pipe, which effectually prevents the passing of the air into the column, or body, of the water, as it ascends in the pipe."

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16. For an *Improvement in Ploughs;* Samuel Myers, Marion county, Ohio, July 11.

Claim.—"What I claim as my improvement, and desire to secure by letters patent, is the mode of altering the set of the plough by means of the rods combined and operating in the manner herein set forth."

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17. For an *Improvement in the Truss;* George W. Riddle, Kingstown, Henry county, Indiana, July 11.

The patentee says,—"My said invention consists in the application of a *block* of acute convexity to the abdominal ring, by means of a branch spring let off from a large main spring which surrounds the body, with two pads attached to the ends thereof, intended to pass longitudinally between the transverse and spinous processes of the inferior portion of the lumbar vertebræ, and the superior portion of the os sacrum; the block aforesaid is intended to produce inflamma-

tory action and consequent adhesion of the parts which have been separated.

"The main spring to support the abdominal viscera, from its wanted pressure upon the abdominal ring, and to support the uterus, and the pads to afford strength and support to that part of the body to which they are applied."

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the particular form of the block, and the size thereof, applied by means of a hernial branch, as above described, the semi-counter force of the main spring and the combination of the pads with the main spring, which will afford strength and support to that region of the body to which they are applied, which is generally more or less affected in cases of Prolapsus Uteri.

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18. For an *Improvement in Hydrants;* Thomas T. Tasker, Philadelphia, Pennsylvania, July 11.

Claim.—"What I claim as new, and desire to secure by letters patent, is the affixing of the whole of the acting part of the hydrant, consisting of the stop-cock, the rising pipe, the rod by which the stop-cock is turned, and their immediate appendages, to a permanent plate at the lower end of the hydrant case, furnished with studs or supports, and with a holding or set screw, or with some analogous and equivalent device, by which the said apparatus may be held in place, and by the retracting of which it may be removed; the whole being constructed, arranged, and operating substantially as herein set forth and made known."

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19. For an *Improvement in Bedstead Fastenings;* John Fowler, Pittsburgh, Pennsylvania, July 11.

The patentee says,—"The nature of my invention consists in fastening each joint of the bedstead by a metallic key and plate of a peculiar construction, so that it can be set up or taken down in a few moments with a very slight exertion, and when put together, making the joints very close and firm."

Claim.—"I do not claim to be the original inventor of the method of fastening the ends of rails to the posts of bedsteads, by having sections of screws on the ends of the rails and corresponding cavities in the posts, and turning the rails in order to draw the parts together; but what I do claim as my invention, and desire to secure by letters patent, is the construction of the key with a cylindrical end beyond the cogs for entering a circular cavity in the bottom of the mortice in the post, for strengthening the joint as before described.

"2nd, Constructing the circular cast plate with reversed segment inclined planes against which the cogs of the key act in drawing the rail and posts together, as described.

"3rd, Securing the rails and posts of bedsteads by means of separate castings of a circular and cylindrical form, constructed and arranged in the manner and for the purpose set forth."

20. For an *Improvement in Mills for Grinding Bark and other substances;* Valentine Birely, City of Frederick, Maryland; July 11.

Claim.—"What I claim as my invention, and which I desire to receive letters patent for, is—

1st, The combination and arrangement of the three grinding and hulling cylinders of different diameters, and arrangement of teeth placed over each other and revolving in opposite directions for carrying the substance to be ground or hulled from one side of the machine to the other, in combination with the three concaves in which the cylinders revolve, arranged on opposite sides of the machine, constructed and arranged in the manner set forth, to prevent the machine from becoming choked, and to cause it to grind freely, by bringing the upper ends of the concave nearly vertically over the centre of the cylinders in the manner before described.

"2nd, In constructing the lower concave with deep parallel grooves or channels between the teeth or ribs to cause the concave to discharge itself freely as above described.

"3rd, The manner of increasing or diminishing the space between the upper edge of the concave and the cylinder, by means of the combination of the turning bars or washers, screws, axle, and plate, as herein set forth.

"4th, The manner of adjusting the lower concave to the cylinder by means of the combination and arrangement of the double set of horizontal sliding plates and screws, arranged and operated as herein set forth.

"5th, The arrangement of the horizontal toothed ties forming part of the back of the hopper in the manner and for the purpose set forth.

"6th, Constructing the hawk-beak toothed cylinder with parallel longitudinal ribs between the hawk-beak teeth, notched, in the manner and for the purpose set forth."

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21. For an *Improvement in Breaking Hemp;* Geo. T. Tate and Wm. English, Frankfort, Pike county, Missouri, July 11.

The patentees say,—"The nature of our invention consists in making the beaters, by which the shives, &c., are to be beaten out of the hemp, with a swell in the middle of their length; and having them project from the surface of a cylindrical or other formed drum, by which peculiarity of form the shives of hemp are immediately spread over the whole length of the beaters, thus greatly facilitating the operation of cleaning; whereas, when the beaters are straight, as heretofore made, the hemp, when presented to the beaters, is not spread by the operation of the beaters, and hence requires much attention from the person who feeds and tends the machine."

Claim.—"What we claim as our invention, and desire to secure by letters patent, is the peculiar manner in which we have constructed the cleaner, that is to say: We claim the making of the beaters, that project from the surface of the drum of the cleaner, with a swell in

the middle of their length, by which the hemp will be spread uniformly over the beaters as described."

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22. For an *Improvement in Corn Shellers;* Cyrus B. Baldwin, Cincinnati, Ohio, July 16.

The patentee says,—"When this machine is put in operation, the corn is dropped into the hopper, and falls against the wheel, where it is intantly shelled, passing by the several ribs of the stationary plate, the hollows between the ribs facilitating the operation, till it falls into the riddle; which, together with the shoe, being shaken in a longitudinal direction, throws the cob out of the machine, the corn at the same time falling through and down upon the screen board, a current of wind being kept up by the fan, it is cleaned from the chaff and other light stuff."

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the stationary plate, constructed in the manner described, in combination with the shelling wheel, as herein set forth."

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23. For an *Improvement in Refrigerators;* David B. Dickinson, Baltimore, Maryland, July 16.

The patentee says,—"The nature of my invention consists in constructing a circular cylinder, in the shape of a barrel or hogshead, or other shape, with a flat or oval top, with one or more doors, for the purpose of placing and removing articles to be preserved. The inner sides of the cylinder, as well as the doors, are provided with boxes or pockets, to contain charcoal or other non-conducting matter; and at the bottom of the cylinder there is also a space or box constructed so as to contain ice."

Claim.—"What I claim as my invention, and which I desire to secure by letters patent, is constructing the combined refrigerator and safe, so as to revolve on a fixed vertical shaft, for obtaining ready access to the articles placed therein for preservation, and for the purpose of ventilating the same, and likewise, so that the several parts may be readily separated from the shaft, to be cleaned, and put together with facility, in the manner hereinbefore described and set forth."

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24. For an *Improvement in Manufacturing Wire Ropes;* John A. Roebling, of Saxonburg, Butler county, Pennsylvania, July 16.

The patentee says,—"The nature of my improvement consists, 1st, In the process of attaching to the ends of the single wires, which are drawn up for the formation of a rope or strand, equal weights, to be suspended freely over small sheaves or pulleys, for the support of which a frame is erected at the end of the rope-walk. While thus all the wires are subjected to a uniform tension, and can, at the same time, contract and expand with the changes of temperature, they may be twisted into a rope or strand, in the manner commonly employed in the manufacture of hemp ropes. Three or more strands thus formed

may again be drawn up, tension weights applied to their ends, and the whole twisted into a thick rope. As all the wires and strands of a rope, made in this manner, will receive a uniform tension, the greatest strength will be obtained, which can be produced by the same amount of material, when united into a solid bar.

"2d. My second improvement is the method or methods I apply for preventing the twist of the fibres of the individual wires, during the process of 'laying.' This is effected by attaching to the end of each wire or strand, a piece of soft annealed wire, which, at the same time, supports the tension weight. The consequence is, that while the rope is twisted, the individual twist of the single wires will run into the annealed wires, and leave the elastic wires of the rope itself uninjured. Or, instead of using an annealed wire, I connect the end of each wire or strand to a small swivel, which is held by a small line or rope, which passes over the pulley and supports the tension weight. The swivels, when lubricated with oil, will, by their own revolutions, allow the wires or strands to turn freely and easily.

"3d. Another part of my improvement consists in the construction of a wrapping machine, for the formation of a perfect and continuous wrapping."

Claim.—"What I claim as my original invention, and desire to secure by letters patent, is—

"1st. The process of giving to the wires and strands a uniform tension, by attaching them to equal weights, which are freely suspended over pulleys during the manufacture as above described.

"2d. The attaching of swivels, or of pieces of annealed wire, to the ends of the single wires, or to the several strands, during the manufacture of a rope, for the purpose of preventing the twist of the fibres, as described above.

"3d. The manner of constructing the wrapping machine, the head of the hull, around which the iron bar revolves by means of its collar, embracing the wire rope firmly, and bearing against the wire, which is being wound upon it; said bar bearing against the face plate of the reel, for the purpose and in the manner herein shown, and the respective parts of which are combined and arranged as above described, so as to adapt it to the particular purpose of winding wire upon wire ropes."

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25. For an *Improvement in Locking Sleds and Sleighs;* John C. Rickey, New Cumberland, Tuscarawas county, Ohio, July 16.

The patentee says,—"The nature of my invention consists in providing a lever, to be applied to each runner of the sled or sleigh, so as to check it, when going down hill, from running forward, and, when going up hill, from running back, and where the roads are sideling and icy, to keep it from running sideways."

Claim.—"What I claim as my invention, and wish to secure by letters patent, is the application to sleds and sleighs, of levers, which will operate on the same, by projecting below the surface of the shoe, and thus prevent it from running sideways, or either back or forward,

as occasion may require, by attaching said levers to the sled or sleigh, in the manner above described, or in any other way that will produce the same effect."

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26. For an *Improvement in Inserting Tubes through the Ground;* Jonathan Ridgeway, City of New York, July 16.

Claim.—"What I claim as my invention, is the application or connexion of a screw to the pipe to be inserted, by which means the pipe is drawn through the ground."

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27. For an *Improvement in Picking Oakum, &c.;* Otis Allen, Tewksbury, Middlesex county, Massachusetts, July 16.

The patentee says,—"In the process of picking tarred rope or junk, &c., (as the machines which have been used in the same have heretofore been constructed,) it has been necessary to boil the rope, junk, &c., for a considerable length of time, previous to passing it through the machine to be picked, which, by reason of the great expenditure of fuel, enhances the cost of the oakum, while the hot water dissolves the tar in the rope, &c., and injures the quality of the oakum when formed.

"By my improvements in the machinery, it is only necessary to soak the tarred rope, junk, &c., in *warm* water for a short time, the remainder of the operations being effectually accomplished by my improved apparatus, and more perfectly than it has heretofore been done; that is to say: the oakum that is made, is of a superior quality."

Claim.—"Having thus described my improvements in the machine for making oakum, I shall claim bruising or crushing the rope or junk, preparatory to its being operated upon by the picking cylinders, by means of a beater or dasher, in combination with the feed rollers and scraper, adjacent to it, (against which it crushes or breaks the rope,) or with such device or devices as are substantially similar, and likewise the combination of said beater or dasher, with the picking cylinder; the whole being arranged and operating substantially in the manner, and for the purpose above set forth."

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28. For an *Improvement in Combining the Open Franklin, with the Elevated Oven Cooking Stove;* Abel Cornell and Hiram R. Merchant, Guilford, Chenango county, New York, July 16.

The patentees say,—"The nature of our invention consists of an open Franklin, and an elevated oven cooking stove, united back to back, and provided with a car in which the fire is placed; said car, together with the fire, is moved into either part of the stove at pleasure."

Claim.—"What we claim as our invention, and desire to secure by letters patent, is the combination of the open Franklin, with the elevated oven cooking stove, by means of the movable grate or car, and swinging back.

"We also claim, in combination with the above arrangement, the valve or damper, for the purpose of regulating the heat of the oven.

"We do not intend to limit ourselves to the exact size, form, or manner of constructing the respective parts aforesaid, but to vary them as we may find expedient, while they remain substantially the same as herein described."

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29. For an *Improvement in Cutting Pegs;* Stephen K. Baldwin, Guilford, Belknap county, New Hampshire, July 16.

Claim.—"What I claim as my invention, and which I desire to secure by letters patent, is, 1st, The method of feeding the bolt, by the combination of the fluted roller, ratchet wheel, and reaching arm, and adjustable lever, connected with the vibrating knife, as above described."

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30. For an *Improvement in Water Wheels;* Eli B. Lansing, Wheeling, Indiana, July 16.

The patentee says,—"The improvement is principally in the manner of constructing the buckets, in combination with a scroll or spiral case surrounding them, for condensing the water, and causing it to act by percussion and re-action."

Claim.—"What I claim as my invention, and which I desire to secure by letters patent, is constructing the radial buckets with inclined plane ends, diverging in contrary directions, in combination with the spiral or scroll case, as herein specified and described."

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31. For an *Improvement in Building and Propelling Vessels;* Thos. L. Jones, City of New York, July 16.

The patentee says,—"My invention consists in the employment of a series of revolving cylinders, placed transversely under a vessel, for the purpose of sustaining and propelling her, the cylinders being provided with paddles, placed spirally on their surface, as hereinafter described—constituting the important feature of my invention. The platform or bottom of the vessel is supported on the journals of these cylinders, and is, consequently, elevated above the water, the cylinders above being in contact with it."

Claim.—"Having described my improvement in the method of propelling and constructing vessels, what I claim as my invention, and desire to secure by letters patent, is, 1st, Arranging the paddles on the transverse revolving cylinders, in series of reversed spirals, as described, so that the current of water thrown by the series on one end, shall be met and thrown back by the series on the other end, whether the two series be arranged on one cylinder, or on two cylinders upon the same shaft.

"I also claim the mode of steering the vessel, by means of the fore and aft, or first and last cylinders in the series, or either of them, the same being made movable, and caused to traverse, for the purpose and in the manner set forth, or in any other substantially the same."

32. For an *Improvement in the Self-Acting Safety Gauge for Steam Boilers;* John A. Roebling, Saxonburg, Butler county, Pennsylvania, July 16.

The patentee says,—"The principle of my invention consists in the application of a common conical steam gauge, such as is generally used on the high pressure boilers of the West, in one of the boiler heads, the stem of the valve being extended inside of the boiler several inches, and furnished with a head, against which the vertical and short arm of a lever will act, whose other and longer arm is supplied with a weight, which may be of the shape of a hammer; this weight being supported upon the surface of fusible metal, which is enclosed in a box, which is placed upon the top of one of the flues, so that when the level of the water sinks below the fusible metal, the rapid absorption of heat from the flue will speedily melt the alloy, which then no longer affords a support to the hammer.

"The pressure of the short lever against the valve stem, which results from the weight attached to the long lever, will now readily open the gauge, and allow steam to escape, which, by its hissing noise, will warn the engineer of the approaching danger.

"The hammer or weight should be raised again to its position, by closing the valve before the deficiency of water is supplied, so that the surface of the alloy may resume its former level, while in a state of fusion. But, in order to assist the rise of the hammer, another gauge is arranged below the first, the stem of which, when pressed, will act upon the lower arm of the lever, and must be kept in that position, until the boiler is supplied and the alloy cooled. Where there is no room for the lower gauge, it may be placed sideways, and the lower lever arm be bent to suit its position.

"To prevent the settling of dirt and sediment from the boiler water, upon the surface of the alloy, the box containing it, may be covered, but so as to leave the hammer and lever at liberty to rise and fall, and allow the water inside to communicate with that outside."

Claim.—"What I claim as my original invention, and desire to secure by letters patent, is the application of a lever, which may be in the shape of a hammer, the head of which rests on the surface of fusible metal, which is contained in a box, and secured upon the top of a flue, so that when the water in the boiler sinks too low, and exposes the alloy, this will melt readily from the heat of the flue, and allow the hammer to sink, which then, by its leverage, will open a gauge, and give alarm by the escape of steam.

"I do not claim the principle of applying fusible alloy, but only the application of a lever in the shape of a hammer, or any other convenient shape, in connexion with a gauge or gauges, to be acted upon by the melting of an alloy, the apparatus being arranged and operating substantially in the manner fully explained and described above."

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33. For an *Improvement in Tanning Leather;* Webb Wallace and Joseph Fleming, Sussex county, New Jersey, July 20.

Claim.—"What we claim as our invention, and which we desire to secure by letters patent, is the use of the machine, constructed as

before described, in the process of tanning leather, for keeping the hides alternately rising and falling in the liquor, during the process of tanning leather, as herein set forth."

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34. For an *Improvement in Cutting Garments;* J. & J. F. Knowland, Brownsboro', Oldham county, Kentucky, July 20.

The patentees say,—"The nature of our invention consists in confining the starting points of the most important measures, to one and the same point on the customer, by means of confining the measuring tapes to a point, which is affixed to an apparatus, which we call the pivot measuring apparatus."

Claim.—"What we claim as our invention or improvement, and for which we desire to secure letters patent, is the plan of measuring the human form from one and the same point, to the most essential points of measurement."

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35. For an *Improvement in Saw Cylinders for Cotton Gins;* Alex. Jones, City of New York, July 20.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the before described mode of mounting the saws on the bars attached to the arms of the spiders, by having the saws notched and fitted on the said bars, instead of fitting them on a shaft or cylinder."

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36. For an *Improvement in Water Wheels;* Jesse Taylor, Auburn, Cayuga county, New York, July 20. (Antedated March 28.)

Claim.—"What I claim, and desire to secure by letters patent, is the combination of a wheel, constructed as aforesaid, with a cylindrical chamber or cistern, arranged within said wheel, having openings or passages, formed in the manner described, for delivering the water on the buckets of said wheel, and supplied from a reservoir placed below it—the top of said cistern being closed to allow of its operating, all as described."

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37. For an *Improvement in Mills, for Grinding all kinds of Grain, &c.;* Justin Ware, Farmington, Trumbull county, Ohio, July 20.

The patentee says,—"The principle of this machine is the combination of the screw principle of Paine & Russel's patent apple grinder, caused by the spiral flutes and ridges, the breaking principle of the corn cracker, by notching half of the ridges, as described in the foregoing specification, and the coffee-mill principle, in the floats or fine teeth at the lower part of the concave and convex."

Claim.—"What I claim as my invention and discovery, and which I desire to secure by letters patent, is the combining of the above mentioned principles of the screw, formed by the spiral flutes and ridges, the breakers, by notching every alternate ridge, and the small teeth or floats at the bottom of the concave and convex, so as to perform, with one machine, the business of the common corn sheller, of the corn crack-

er, in preparing ears of corn to grind, of the common grain mill, in grinding it, and all other kinds of small grain for provender, of grinding stone coal, plaster, and potter's clay, and, by removing that part in the concave containing the small teeth, to grind apples and all other soft vegetables."

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38. For an *Improvement in Turning Fence Pickets, &c.;* Elisha Briggs, Perry, Wyoming county, New York, July 20.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the arrangement of machinery, by which a stick of any length is carried through, in combination with the revolving cylinder, with gouges or chisels on its anterior end, so arranged that the stick may be rounded while passing through the cylinder."

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39. For an *Improvement in Manufacturing Salt;* Calvin Guiteau, Syracuse, Onandaga county, New York, July 23.

The patentee says,—"The nature of my invention consists of four boilers, set in walls made of stone and brick."

Claim.—"What I claim as my own invention, and desire to secure by letters patent, is as follows, viz:

"The manner of setting my four boilers as described, with their fixtures, for carrying out and effecting thereby the object of simplifying the mode of making more coarse and fine salt, with less labor, fuel, and expense, than has ever been done or known before in the United States. With two salting vats, of 160 feet each in length, with 3¼ cords of wood, 150 bushels are made, weighing from 70 to 80 lbs. to the measured bushel; and from the rear boilers, 50 bushels of pure fine salt, from pure saturated brine, with an overplus of brine remaining.

"Also, by the extension of the salting vats to 200 feet in length, and bringing in the steam from the two boilers, to increase and equalize the heat in the rear part of the salting vats, will greatly increase the amount of salt, with but a small addition of wood.

"Also, by the use of the condensed steam, from the rear end of the steam boxes, which, being pure water, will avoid blocking the boilers with limy incrustations, as could not be avoided by the use of the fresh water of this region of this country, being universally impregnated with lime.

"Also avoiding blocking the boilers, by keeping short of saturation, and drawing off the water with its impurities 5° from saturation, as they are driven from their suspended state, by the force of heat, and rise to the surface, and are drawn into the side vats, and saturation completed by fine salt taken from the rear boilers, where, in this manner, the last of the impurities are separated and deposited. By this process, the great difficulties of making salt are remedied, and is not only new, but the most useful of anything known in the history of salt making."

40. For an *Improvement in Water Wheels;* Samuel L. Valentine, Bangor, Maine, July 23.

The patentee says,—"The nature of my invention consists in constructing a tub-wheel, in such a manner that it can be made of cast-iron, either whole or in segments, allowing the water to escape at the periphery of the wheel, permitting the wheel to move beneath the water, and combining the power of the percussion and re-action."

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the combination of the buckets, of the form described, with the beveled or inclined form of the rim, supporting the buckets, as set forth and described."

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41. For an *Improvement in Smelting Furnaces;* Jacob Van Reed Hunter, Rockland, Berks county, Pennsylvania, July 23.

Claim.—"What I claim as new, and desire to secure by letters patent, is the increasing the diameter of the interior of the furnace, above the boshes, in the manner herein set forth, and in a proportion which shall be substantially the same with that herein designated.

"I also claim, in combination with this form and enlargement of the interior, above the boshes, the particular manner in which I diminish the upper portion of the furnace, towards the tunnel head, in the proportions substantially as designated."

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42. For an *Improvement in Coupling Conduit Pipes;* Uel West, City of New York, July 23.

Claim.—"What I claim, and desire to secure by letters patent, is the mode of connecting the joints of conduits, hydrants, &c., by means of beveled flanged joints, in the manner herein described, or in any other essentially the same."

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43. For an *Improvement in Cheese Presses;* Chester Stone, F. K. Collins, and George S. Collins, Rootstown, Portage county, Ohio, July 28.

Claim.—"What we claim as our invention, and desire to secure by letters patent, is the application of the power of the screw and joint lever, in a self-acting press, for the purpose of pressing cheese, as herein described."

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44. For an *Improvement in the Manufacture of Collets, &c., in the Making of Buttons, and for other purposes;* Moses Ferre, Williamsburg, Hampshire county, Massachusetts, July 28.

The patentee says,—"The principal improvement in my machine consists in the manner in which I have constructed and arranged that part of the apparatus, by which the feeding of the blanks into the die box is effected, and in which they are to be operated upon, by the die and punch."

Claim.—"Having thus fully made known the manner in which I construct and arrange the respective parts of my improved machine, for forming collets, washers, and other articles, from metallic disks, for the manufacturing of buttons, or for other purposes, what I claim as new, and desire to secure by letters patent, is the manner in which I have combined and arranged the respective parts, constituting the feeding apparatus, as herein set forth; that is to say: I claim, in combination, the trough, with its follower; the gate, with its spring catch; the channel, and the cap, operated upon, and co-operating with, each other, in effecting the purpose described, and substantially in the manner herein made known."

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45. For an *Improvement in the Power Loom, for Weaving Counterpanes and other figured goods;* E. B. Bigelow, Lancaster, Massachusetts, July 28. (Antedated May 1.)

The patentee says,—"These improvements in looms consist, 1st, In the manner of strengthening the lathe, the breast beam, and the top back girth, in order to weave cloth of great width and thickness; and, secondly, In the manner of delivering out the chain, or warp, and of taking up the finished cloth, which is effected in such a manner, as to cause a given number of threads of filling to form a given length of cloth."

Claim.—"Having thus fully described the improvement in the power loom, it is to be understood that I do not claim the employment of a measuring roller, or of measuring rollers, operating upon the principle, or in the manner of that herein described, for the purpose of regulating the action of the machinery used to deliver out the chain or warp, or to regulate the operation of that employed to take up the finished cloth; but I do claim the manner herein described, of constructing and arranging the apparatus, by which the measuring roller is connected with such machinery, whether employed to deliver out the chain or warp, or to take up the finished cloth; and these I claim, whether the apparatus used for attaining the end in view, be made precisely in the form and manner herein set forth, or in any form which is substantially the same in its construction and operation.

"I also claim the herein described improvements, in the manner of strengthening the lathe, the breast beam, and the top back girth, in order to weave cloth of great width and thickness; the manner in which I have constructed and arranged the parts for effecting this object, being the introduction of one, two, or more intermediate cross frames, and one, two, or more intermediate and additional swords, which are, as I believe, altogether new and essential in the weaving of broad and heavy goods."

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46. For an *Improvement in Floating Dry Docks;* John S. Gilbert, City of New York, July 28.

Claim.—"Having thus fully described my improved floating balance dry dock, and also the mode of using it, I do hereby declare that what I claim as of my invention, and desire to secure by letters patent, is:

"First. I do not claim simply making and using camels, placed against each side of a vessel, and by which she is raised and floated over shoals, they having been used before my invention; neither do I claim making and using a floating dry dock, with tanks or trunks on each side, divided into separate compartments by tight bulk-heads, because that kind of dry dock I have patented. And further, I do not claim simply uniting the separate compartments of a float with a pump-well, by means of pipes, governed by cocks or valves, as this has been patented; but in the patent referred to, the separate compartments of a float are united with a pump-well, the dock being composed of a series of such floats, on the tops of which the vessel rests. But what I wish to claim as my invention, and desire to secure by letters patent, is the *method* of connecting all the chambers, or separate compartments, on each side of the dock, with the pump-well, by means of pipes or conductors, governed by cocks, gates, or valves, whereby all the separate compartments are made to act in concert or alone, or any number of them, in depressing or raising the dock, in manner substantially as herein described. And I wish it distinctly understood, that I claim this arrangement, whether applied to docks with two side camels united together, or to side camels disconnected.

"Second. I claim the dividing the camels into an upper and lower chamber, to hold, by means of a tight bulk-head, in the manner and for the purposes as substantially herein described.

"Third. I claim making and using gates on the sides of floating dry docks, in combination with the tanks or trunks, for the purposes, and in the manner as substantially herein described."

An Act to provide Additional Examiners in the Patent Office, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That there shall be appointed, in the manner provided in the second section of the act entitled "An act to promote the progress of useful arts, and to repeal all acts and parts of acts heretofore made for that purpose," approved July fourth, eighteen hundred and thirty six, two principal examiners and two assistant examiners, in addition to the number of examiners now employed in the Patent Office; and that hereafter each of the principal examiners employed in the Patent Office shall receive an annual salary of twenty-five hundred dollars, and each of the assistant examiners an annual salary of fifteen hundred dollars: *Provided,* That the power to extend patents, now vested in the board composed of the Secretary of State, Commissioner of Patents, and Solicitor of the Treasury, by the eighteenth section of the act approved July fourth, eighteen hundred and thirty-six, respecting the Patent Office, shall hereafter be vested solely in the Commissioner of Patents; and when an application is made to him for the extension of a patent according to said eighteenth section, and sixty days' notice given thereof, he shall refer the case to the principal examiner having charge of the class of

inventions to which said case belongs, who shall make a full report to said Commissioner of the said case, and particularly whether the invention or improvement, secured in the patent, was new and patentable when patented; and thereupon the said Commissioner shall grant or refuse the extension of said patent, upon the same principles and rules that have governed said board; but no patent shall be extended for a longer term than seven years.

Sec. 2. *And be it further enacted*, That hereafter the Commissioner of Patents shall require a fee of one dollar for recording any assignment, grant, or conveyance of the whole or any part of the interest in letters patent, or power of attorney, or license to make or use the things patented, when such instrument shall not exceed three hundred words; the sum of two dollars when it shall exceed three hundred and shall not exceed one thousand words; and the sum of three dollars when it shall exceed one thousand words; which fees shall in all cases be paid in advance.

Sec. 3. *And be it further enacted*, That there shall be appointed, in manner aforesaid, two clerks, to be employed in copying and recording, and in other services in the Patent Office, who shall each be paid a salary of one thousand two hundred dollars per annum.

Sec. 4. *And be it further enacted*, That the Commissioner of Patents is hereby authorized to send by mail, free of postage, the annual reports of the Patent Office, in the same manner in which he is empowered to send letters and packages relating to the business of the Patent Office. Approved May 27, 1848.

MECHANICS, PHYSICS, AND CHEMISTRY.

Account of the Experiments to determine the Principal Laws and Numerical Data, which enter into the Calculation of Steam Engines, by M. V. Regnault.

(Continued from Vol. XV., page 441.)

FOURTH MEMOIR.

On the Measurement of Temperatures.

"We do not as yet possess any direct means of measuring the quantities of heat absorbed by a body under given circumstances, and we recognize this absorption of heat only by the changes which occur in the state of the body, or by its dilatation. The name *thermometer* is given to the instrument whose object is to indicate the variations in the quantities of heat in any medium. These instruments are generally founded upon the dilatation which bodies undergo by the action of heat, or upon the changes in elastic force which the same bulk of a gas experiences under the circumstances to which the medium is submitted."

"A perfect thermometer would be one whose indications were always proportional to the quantity of heat which it had absorbed, or, in other words, one in which the addition of equal quantities of heat produced always equal dilatations. To fulfil this condition it is neces-

sary either that the capacity for heat, and the dilatation of the thermometric substance should remain invariable during the experiment, or that these two elements should vary strictly inversely as each other."

"Nor would the perfect thermometer yet indicate the quantity of heat absorbed by the medium under given circumstances, unless this medium presented the same advantages as the thermometric substance, that is, unless it absorbed equal quantities of heat for equal variations of temperature as noted by the thermometer."

"But a comparative study of the dilatations of different substances under the same circumstances, quickly shows that they are far from following the same law; and if we compare together the quantities of heat absorbed by these different bodies when brought successively to different temperatures measured by the dilatations of one of them, we see that these quantities are variable, and unequally variable in each one of them, without our having been able heretofore to show the relations which exist between these variations of capacity and the changes of bulk."

"The great precision which can be obtained in the construction of the mercurial thermometer, the facility with which the thermometric liquid may be obtained of the same degree of purity, and the great extent of temperature through which this liquid preserves the same state, have given to the mercurial thermometer, the preference over all other instruments of the same kind, and have caused its adoption almost exclusively for all precise experiments."

"But there is an essential condition which every apparatus for measurement ought to satisfy; it is that it should not only remain rigorously comparable with itself, that is, that it should always mark the same degree under the same circumstances, but it is moreover necessary that we should be able to reproduce it at will, and obtain always instruments rigorously comparable."

"Physical philosophers have thought that they had completely attained this end, by making the scales of the mercurial thermometers agree at certain normal temperatures which are easily reproduced and always perfectly identical; for this purpose they have adopted the constant temperature at which ice melts, and that not less constant which saturated steam presents when it exerts an elastic force of 76 millimetres. But I have shown *(Annales de Chimie et de Physique, 3d Série, tome* v, *pages* 100 *et seq.,)* that two mercurial thermometers adjusted for the same fixed points of melting ice, and boiling water under a pressure of 76 mm., may show very considerable differences in their movements beyond these fixed points, if they are not made of glass of the same nature. Even when the glasses of the reservoirs present the same chemical composition there may still be very sensible differences in their indications according to the way in which the reservoirs have been worked in the glass-blower's lamp, the molecular state of the glass, undergoing very notable alterations during this working."

"The mercurial thermometer then, as it has been constructed up to

the present time is defective in one of the most essential conditions which ought to be required of an apparatus for measurement; it cannot be always reproduced in the same state; and the different instruments of the same kind are rarely comparable with each other beyond the fixed points of their scales."

"Physical philosophers thought that they had observed that all the gases dilate exactly the same fraction of their volume at 0°, when they are carried from the temperature 0° to that of 100° (32° to 212° Fahr.). This law so remarkable for its simplicity, naturally led them to think that the dilatation of the gases ought to be in a more simple ratio to the quantities of heat than that of solids or liquids. Some, more bold, even concluded that the dilatation of gases must be rigorously proportioned to the quantity of heat, and that the gas thermometer was the true normal thermometer, to which all the phenomena of heat ought to be referred."

"We now know that this great simplicity in the law of the dilatation of the gases is far from existing. I have shown in the memoir upon the dilatation of gases that not only the different gases have not the same coefficient of dilatation, but that even for the same gas this coefficient varies with its density. The indications of gas thermometers, then, can only be considered, like those of other thermometers, as functions more or less complicated of the quantities of heat."

"But the gas thermometers present an advantage over the mercurial and in general over all liquid or solid thermometers, an advantage which arises from the greatness of the dilatation of the thermometric substance. In any thermometer formed by a liquid or gaseous substance, the indications of the instrument depend upon the dilatation of this substance, and of that of the substance in which it is inclosed. Now the dilatation of mercury is only about seven times greater than that of the glass which holds it; and the variations which we remark in the law of the dilatation of the different glasses, form very appreciable fractions of the apparent dilatation of the mercury, and consequently influence in a notable manner the indications of the instrument. In the gas thermometer, on the contrary, the dilatation of the gas being one hundred and sixty times greater than that of the glass, the variations of the law of dilatation of the different glasses no longer sensibly influence the indications of the apparatus, and do not prevent the instruments from being comparable."

"If then we wish to profit by this important property, and adopt the gas thermometer as a standard, we must study several important questions so as to fix the conditions under which the instruments will remain comparable."

"The present memoir has for its object the study of the different methods which have been imagined for measuring temperatures in experiments which require great precision. I will divide it into three parts: in the first part, I will treat of the gas thermometer; in the second, of the mercurial thermometer; and in the third, of the measurement of temperatures by means of thermo-electric currents."

Part First. Of Gas Thermometers.

« When a gas enclosed in a mathematically elastic envelope is submitted to an elevation of temperature, its volume increases and the gas retains the same elastic force. But if we prevent this dilatation of the gas, by exerting a proper degree of pressure over the whole surface of the envelope, the gas retains the same volume, but its elastic force increases.

« There are then two modes of employing a gas as a thermometric substance. The gas may be placed under circumstances such, that the pressure which retains it remains constant, and its increase of bulk be observed ; or the gas may be compelled to keep the same bulk, and its increase of elastic force be examined."

« *First Method.* In order that a gas should realize the conditions prescribed by this method, which are very nearly those found in the mercurial thermometer, it would be requisite that the gas submitted always to the same pressure, should expand freely in a gauged reservoir, kept throughout at the same temperature. But these indications cannot be fulfilled in practice, at least if the apparatus is to be submitted to high temperatures."

The thermometer must therefore be composed of a reservoir which is to be exposed to the temperature which it is desired to measure, and a gauged tube, united to the reservoir by a capillary tube which removes the other from the place where the temperature is to be measured. This gauge tube fulfils the purpose of the graduated stem of the mercurial thermometer, and serves to collect the gas which the rising of the temperature drives out of the reservoir. This tube may also be kept at a constant temperature differing but little from that of the surrounding air. At any moment during the experiment the gas is composed of two parts: the first, contained in the reservoir, is at the temperature to be found, the other in the tube is at the surrounding temperature. These two portions are at the same pressure, which may be brought as nearly as is desired to that of the atmosphere. The equations derived from these conditions permit us to calculate the required temperature.

This arrangement is the one adopted by M. Pouillet, in his air pyrometer, (*Traitè de Physique, t.* 1, *p.* 266,) and M. Regnault himself employed it in his fifth series of experiments made to determine the dilatation of gases. (See page 280.) It presents a very serious inconvenience when the apparatus is to be used for the measurement of high temperatures. In fact it will easily be seen that in this case the far greater part of the air will already be in the gauged tube, and but little will remain in the reservoir, so that a further elevation of the temperature will cause but a very small portion to pass over into the tube, and this will with difficulty be measured with the proper degree of accuracy.

In fact it can be easily shown that, calling the temperature x, and the coefficient of dilatation of the gas a, the sensibility of the apparatus will vary very nearly inversely as $(1+ax)^2$. This circumstance led M. Regnault to reject this arrangement for a gas thermometer.

Second Method. In the second method the gas is kept constantly of the same volume, and the elastic force which it presents under different circumstances is measured; then from these by the law of Mariotte, we may calculate the dilatations which the gas would have undergone if the pressure had been kept constant.

The apparatus founded upon this second method are much more easily managed, and give greater precision than those constructed according to the first method: they have moreover the advantage of presenting the same sensibility at high as at low temperatures. By placing in these apparatus air of atmospheric pressure when the reservoir is surrounded by melting ice, we are sure to have instruments rigorously comparable. Nevertheless, if we desire to measure very high temperatures, if for instance the instrument is to be used as an air pyrometer, it is to be feared that the elastic force of the gas within, becoming very considerable, the envelope may experience a permanent change of form under the great interior pressures. This inconvenience may be avoided by introducing into the apparatus, air under an initial pressure less than that of the atmosphere, when the reservoir is at 0°. In this way the elastic force may be kept within limits as low as may be desired, but it is evident that the apparatus becomes less sensitive in proportion as the elastic force of the gas at 0° is feebler; still as the measurement of the elastic force may be made with extreme precision, the indications of the apparatus will be in the greater number of cases sufficiently exact, even though the initial pressure of the gas at 0° was but one-fourth of that of the atmosphere.

But here a very important question presents itself: *are air thermometers filled with air at very different densities comparable with each other?* That is, will such instruments agree at all temperatures when their scales have been made to accord at 0° and 100°? We have before seen (p. 282,) that the absolute value of the coefficient of dilatation of a gas changes very notably with its density; it is required to know whether the changes of density will not produce besides, sensible differences in the law of dilatation. It is absolutely indispensable to decide this question in order to fix the conditions under which air thermometers shall be established in order to be comparable with each other. M. Regnault also proposed for himself a second question which he thinks not less important than the first, viz: *Do gas thermometers, filled with gases of different kinds accord with each other when they have been adjusted at* 0° *and* 100°?

The apparatus used in these investigations consisted essentially of two gas thermometers placed side by side in the same boiler.

Each of these thermometers was composed of a globe of flint glass, (crystal,) of from 700 to 800 cubic centimetres content, terminated by a recurved capillary tube, and a manometric apparatus. The two globes were kept, by copper wires, side by side on a metallic support, consisting of two metallic plates of lozenge form placed one below, the other above the globes, and united by iron rods which were permanently fixed to the cover of the boiler, the upper plate was pierced with two holes through which passed the stems of the air thermome-

ters, and with two other holes, situated in a line at right angles to that joining the first, through which passed the stems of two mercurial thermometers.

The boiler-cover was permanently fixed to a solid partition, and the copper boiler was attached to it by screw bolts, so that it could be removed or replaced without disturbing the thermometers.

The manometric apparatus was composed of two glass tubes of 12 or 14 mm. interior diameter, cemented into an end piece of cast iron provided with a stop cock so arranged, that by properly turning it, you could at pleasure either cause the two tubes to communicate together, or discharge the mercury from either of them, or intercept the communication of the tubes with each other and with the open air. The manometers were fixed to the side of the partition opposite to the boiler.

The capillary tubes of the air reservoir were connected with the capillary tubes of the manometers, by bringing these tubes into exact contact at their ends, and cementing over them a brass tubulure, grooved to fit them outside. This brass tubulure had a rectangular tube opening into it, into which was cemented a capillary tube, by means of which communication was made with an air pump, so as to dry the apparatus and introduce the gases to be operated on.

The boiler contained oil which was constantly agitated so as to maintain an uniform temperature throughout the whole bath.

The method of operating is as follows:

In the first place, to dry the apparatus, a little mercury is put into the inner manometer tube, and the stop-cock so placed as to cut off this tube from communication with the other and with the opening. The lateral tube of the tubulure is then put into communication with an air pump furnished with several tubes filled with pumice soaked in concentrated sulphuric acid, which are intended to absorb the moisture. A vacuum is made a great number of times, and each time the air is allowed to enter very slowly. To be sure that the drying is complete, the globes are heated to 50° or 60° (122° to 140° Fahr.). The pump is then removed but the tubes are left open in communication with the drying tubes. Suppose now that it is desired to compare the movement of a thermometer containing air whose elastic force at 0° is 76 mm., with that of another containing air of a less elastic force.

The two globes are surrounded with melting ice, and the stop-cock of the first manometer being so placed as to make a communication between the two manometer tubes, mercury is poured in so as to raise its level to a mark placed near the top of the inner tube, (that is, the one communicating with the reservoir). The two mercurial columns will be necessarily at the same level because the apparatus communicates freely with the air by the tubulure.

On the other hand a partial vacuum is made in the second globe, and the rarefaction of the air in it is determined by the difference of height of its manometric columns; when a proper rarefaction has been attained, the apparatus is closed by hermetically sealing the lateral capillary tube of the tubulure, and mercury is then poured into the

manometer until its surface stands at a mark made near the top of the inner manometer tube.

The elastic forces are measured by four properly placed cathetometers, each one being so placed as to be able to follow the meniscus in one of the tubes.

The necessary observations of the height of the barometer, and the position of the meniscus of each of the manometer tubes being made, the lateral tube of the first reservoir is then hermetically closed, the ice removed and replaced by oil which is heated by a furnace placed under it. The oil bath is heated until the temperature at which the two instruments are to be compared is attained, the air holes of the furnace are then more or less closed and the oil kept in constant agitation; and the thermometers are adjusted for observation by pouring mercury into the manometer tubes, so as to bring back the level of the columns in the inner tubes to the marks made upon them. The temperature then rising only very slowly, the movements of the four columns of mercury are simultaneously watched, and when they are perfectly stationary, at a signal given by one of the observers the barometer is read, and the temperatures of the air in the vicinity of the manometer tubes, and of the lateral tubes attached to the reservoirs, noted.

As it is essential in this mode of experimenting to keep the temperatures stationary as long as possible, they should be raised very slowly when approaching the maximum at which the observations are to be made, and by a little practice a series of observations may be got at temperatures not differing more than 1° from each other, and the observer be assured that one instrument is not behind the other in its indications. This precaution is above all indispensable when the air thermometer is compared with the mercurial.

It is not necessary, and would be very difficult to bring the mercury in the manometers exactly to the marks. It is sufficient to bring them nearly there, and as the observations give exactly their differences of level, the volumes can easily be calculated when the tubes have been gauged in the vicinity of the marks. The experiments upon thermometers filled with different gases are conducted exactly in the same way.

These globes were too thin to permit the experiments upon thermometers filled with air at a much higher pressure than 76mm. to be tried with them; recourse was had to others similar, but having their walls 3 or 4 mm. thick. These globes were of rather less capacity than the former, holding only about 600 cubic centimetres.

A great number of experiments were made by M. Regnault with the apparatus in which air of ordinary density was compared with that of much less, and with that of much greater density, as well as with hydrogen gas, carbonic and sulphurous acid, and the principal conclusions which he draws from them are as follows:

1. The atmospheric air follows the same law of dilatation from 0° to 350° (32° to 662° Fahr.) of temperature, even when its initial elastic force at 0° varies from 0·^{m}4 to 1·^{m}3, (1·33 to 4·25 ft.). So that in the construction of an air thermometer, no attention need be paid to

the density of the air introduced, the instruments will be comparable whatever may be the density.

"2. Atmospheric air, hydrogen gas, and carbonic acid, follow between 0° and 350°, sensibly the same law of dilatation, although their coefficients of dilatation are sensibly different. So that thermometers made with these different gases will accord, provided the temperatures are calculated from their proper coefficients. From this it follows that the coefficients of dilatation of these gases present sensibly the same ratio at every temperature."

"3. Sulphurous acid gas departs notably from the law of dilatation which the preceding gases present. The coefficient of dilatation of sulphurous acid diminishes with the temperature as marked by an air thermometer."

"It is important to remark that in these experiments the relative dilatations of the gases were not measured directly, but were deduced by calculation from the observation of the elastic forces which these gases present at the same temperatures, their volume remaining constant. It appears very probable that similar conclusions would be arrived at, by measuring directly the increase in bulk of the different gases for the same temperatures, their elastic force remaining constant, by a method analogous to that of the fifth series of experiments upon the dilatation of gases; but these experiments would not be susceptible of equal precision in the measurements for reasons already given at the commencement of this memoir, (p. 51.)

(To be Continued.)

List of the Different Processes adopted for the Preservation of Wood, from the year 1657 *to* 1846; *prepared by* M. J. A. Stoeckhardt.

Extracted from "the Artizan;" London, April 1848.

In our October number of last year, we directed the attention of our readers to this subject, than which, it is difficult to conceive one of greater importance in connexion with railway construction. The influences in operation tending to the decay of wooden sleepers, we stated to be as follows:—The solubility of the animal matter they contain—the weak cohesion of their parts—their four-fold composition, as the more numerous the elements in the composition of a body, the more rapid is its tendency to decompose—the oxygen of the air, heat, and humidity—the azotic matter which wood contains, and the attacks of insects, such as ants and teredos. We then stated the most effectual methods hitherto employed for the preservation of wood, together with the cost of the various operations. We now present to our readers a list of the different processes adopted for the preservation of wood, from the year 1657 to 1846, which has been carefully prepared by M. J. A. Stoeckhardt.

No	Date.	Discoverer.	Peparation Employed.	Mode of Application.
1	1657	Glauber .	Vegetable tar and pyroligneous acid . .	The wood having been carbonised by the action of fire, is covered with a coating of tar, and immersed in pyroligneous acid.
2	1740	(?)	. . . . .	Exposing the wood to the action of vapor.
3	1798	Volmeister .	Solution of sea salt	Washing and immersion.
4	1806	Perkins .	Ditto	The interstices of the wood filled with dry salt.
5	1815	Bowden .	Salt water	Repeated immersion of the wood in the sea.
6	1820	Pasley .	Undecomposable liquids, such, for instance, as the acids(?)	The wood is first boiled in water, and then the concentrated liquids applied.
7	1821	Knowles & Davy	Chloride of mercury . . .	Immersion.
8	1821	Dimsdale .	Vegetable tar, from which the pyroligneous acid had previously been extracted	Repeated immersions.
9	1822	Prechtl .	Vapor of tar	The wood is first exposed to the vapor of water alone, and afterwards to that of a mixture of water and tar.
10	1823	Oxford .	Oil of tar, previously treated with gaseous chlorine	Repeated coatings.
11	1824	Cox .	Mixture of fish oil, rosin, and sulphur .	Saturated by coating the wood and rubbing.
12	1825	Langton .	. . . . .	Extraction by a vacuum, of the air from heated wood.
13	1826	Newmarch .	Mixture of linseed oil, sulphate of iron, verdigris, arsenic, and alum	Boiling the wood in the mixture for three hours.
14	1828	Gossier .	Saline solutions, forming mutual decompositions, and leaving in the wood an insoluble combination: for instance, *a*, chloride of calcium; *b*, Glauber salt, sulphate of iron, arseniate of soda	Alternate immersions in solutions of the various salts.
15	1829	Carey .	Mixture of salt, powdered charcoal, and animal or vegetable oil	The wood having been perforated at different points, the mixture is introduced, and the hole closed.
16	1831	Breant .	Oily and resinous matters, or solutions of appropriate salts	The wood is impregnated by pressure in a vertical cylinder, in the natural state, or after having exhausted the air and the sap. The exhaustion is performed by means of another large cylinder communicating with the first, and into which the steam passes, which is condensed by an injection of cold water, and which answers the purpose of an air pump.
17	1832	(?)	Smoke	The wood is exposed for a long time to the smoke of green wood, burning slowly.

18	1832	Kyan	Solution of chloride of mercury	Immersion, and afterwards by pressure.
19	1832	(?) and since Chevalier, 1836.	Tar and decoction of tobacco leaves	Immersion or coating.
20	1833	(?)	Solution of rosin in fish oil	Coating and repeated rubbing.
21	1833	(?)	Solution of india rubber in fatty oils	Idem.
22	1834	Strutzke & Society of Arts, Berlin.	Solution of the sulphate of iron	Repeated coatings, or introduction of wood with beds or layers of iron pyrites.
23	1835	Monteith	Lime water	Immersion.
24	1835	(?)	Solution of rosin in oil of turpentine	Rubbing with a hot solution.
25	1835	Moll	Vapor of eupion and creosote	Exposing to the action of the vapor of the eupion and creosote in closed and heated vessel.
26	?	(?)	Concentrated sulphuric acid	Coating to carbonize the surface of the wood.
27	1837	Flockton	Oil of tar and pyrolignite of iron	Immersion.
28	1837	Granville	Refuse water of salt works	Idem.
29	1837	Letellier	Chloride of mercury and solution of gelatine	The wood is immersed in a solution of the chlorine, dried, and then coated with a slight layer of glue.
30	1837	Gotthill	Resinous solutions; as, for instance, tar and oil of turpentine, with the addition of salt	Immersion from one to two hours in a solution heated from 275° to 399° Fah., with or without application of pressure or a vacuum.
31	1837	Margary	Solution of sulphate or acetate of copper	The wood first dried is then immersed in the solution.
32	1837	Industrial Society of Annaberg.	Soluble glass and hydrochloric acid	The wood is immersed for thirty days in the soluble glass, and then placed in water acidulated with hydrochloric acid, washed, dried, and rubbed with oil.
33	1838	Treffy	Salts which mutually decompose each other, as for instance, *a*, chloride of tin or copper; *b*, soda, or lime water	Alternate immersions in the liquids.
34	1838	Burnett	Chloride of zinc	Immersion of from ten to twenty days.
35	1838	Bethell	Bituminous liquors, or those which contain creosote; for instance, oil of tar, pyrolignite of iron deprived of ammonia	Extraction of the air, and introduction of the preparations by means of powerful pressure.
36	1839	Boucherie & afterwards Uzielli.	Pyrolignite of iron, pyroligneous acid, muriate of lime, sulphate of copper, chloride of mercury, &c.	The solutions are introduced by the natural absorbing power of the living tree, or incorporated with the wood immediately after it is cut down.

No.	Date.	Discoverer.	Preparation Employed.	Mode of Application.
37	1840	Fliselli .	Substances which mutually decompose each other; as, for instance, soluble glass, and afterwards dilute sulphuric acid, or solutions, first of alum, and afterwards of potash	The wood is first steamed in a cylinder, the solution of alum or other salt is then introduced and boiled by steam: the alum fixed in the wood is then decomposed by a solution of potash.
38	1840	Münzing .	Sulphate of muriate of protoxide of manganese, the refuse liquor of the chlorine works	Immersion in the solution.
39	1841	Pons	Solution of nitrate of iron, saltpetre, alum, and ferrocyanide of potassium	Idem.
40	1841	Payne and afterwards Banner.	Salts which mutually decompose each other; as, for instance, muriate of lime, sulphates of iron and potass, alum and potash	The wood is placed in an iron cylinder, in which a vacuum is produced, and then filled with the first solution, which enters the wood by powerful pressure; this solution is then run out, and the second introduced, when the pressure is again employed; in some cases it will be found necessary to dry the wood either partially or entirely, between the first and second saturations.
41	1842	Timperly .	Chloride of mercury . . .	Immersion.
42	1843	Parkes, afterwards Passey, 1845.	Caoutchouc dissolved in carburet of sulphur eupion	Coating or impregnation.
43	1843	Earle . .	Solution of sulphate of iron or copper .	Immersion.
44	1844	Burkes, and after Reichenbach.	Soluble glass and sulphate of iron . .	The wood is first steamed, then impregnated with solution of sulphate of iron, and lastly with the soluble glass.
45	1845	Ransome, & afterwards Newton.	Solution of silica in caustic soda (soluble glass), afterwards decomposed by an acid	After having expelled the air from the pores of the wood, the solution of soluble glass is introduced by pressure; afterwards place the wood a short time in a diluted acid.
46	1846	Venzat & Banner.	Solution of sulphate or muriate of copper, afterwards decomposed by baryta	Impregnation, as No. 40.
47	1846	Payne .	Solutions of metallic sulphurets (lime and baryta), decomposed afterwards by an acid or metallic salt (sulphate of iron, &c.)	Extraction of the air by the vapor of water, and alternate introduction by pressure of the preparations which can decompose each other, as No. 40, so as to leave in the wood a deposit of sulphur or metallic sulphuret, insoluble, and of sulphuret of lime.

On a Formula for the Elastic Force of Vapor at different Temperatures. *By* CAPTAIN SHORTREDE. *Communicated by Lieut. Col. Sykes, F. R. S.*

The author adopts, as the basis of his formula, the first series of experiments at high temperatures, made by the French Academy, and those of Magnus at low temperatures. For the Academy's experiments, he adopts the indications of the smaller thermometer in the steam, in preference to those of the larger thermometer in the water. Of Dr. Young's sort of formulæ, he notices that of the Academy, and several others, with exponents varying from 5 to 7. From the elasticity at freezing, as given by Magnus, compared with four of the Academy's experiments, he shows that for the range of observation, the number 6 is preferrable to 5 as an exponent; but, as he states, no formula of this sort, with a constant index, can be found to agree with the observations throughout.

The formula of Magnus he finds to agree with these observations better than any of the others; but being adapted to the air-thermometer, and therefore not convenient for ordinary use, he gives his own formula adapted to the mercurial thermometer,

$$t=\frac{500+225\log. A}{5-\log. A},$$

t being the temp. Cent., and A the elasticity in atmospheres of $0^{m}\cdot76$ at zero, or 30 inches at 58° Fah.; ∴ the temperature being given, the formula becomes

$$\log. A=5-\frac{1625}{225+t}.$$

The author compares with the experiments the formula of the Academy, and those of Southern, Coriolis, Tredgold, and one deduced as above; also that given by August, and the same modified, so as to give at freezing the elasticity found by Magnus; also that of Magnus, and the same reduced to the mercurial thermometer, by the data of Dulong and Petit; and lastly, his own formula. Then assuming that the experiment of Magnus are represented by his formula, he compares the other formula with it at every 10° from —10° to 100° Cent. He shows that for the range of their experiments, the Academy's formula is better than the others of Dr. Young's sort; but at low temperatures it is very erroneous. Southern's formula at low temperatures is better than that of Coriolis, but at high temperatures not so good. Tredgold and the other like it, are better at low temperatures than that of Coriolis, but worse at high temperatures. August's formula is very erroneous; and in its modified form it is still worse, the errors increasing to about 10° or more, showing that the theoretic considerations by which it is deduced are not founded in truth. With the Academy's experiments, the errors of Magnus's formula are —, but when reduced to the mercurial thermomoter they are all +, the mean of the whole being $0^{\circ}\cdot33$. With the new formula the errors are nearly balanced, the sums on the thirty experiments being $-1^{\circ}\cdot78$ and $+3^{\circ}\cdot55$, in only two cases

amounting to half a degree. On the twelve experiments, at or near the maximum, the errors are — 1°·12 and + 0°·43.

From zero to 100° the differences between the new formula and that of Magnus are all of one kind; and when reduced to temperature are less than 0°·4, which the author thinks to be within the probable difference between the air and mercurial thermometers, and within the errors of observation.

He then gives a table of temperature, corresponding to elasticity of vapor in atmospheres. Also modifying his formula,

$$\log. f 6{\cdot}47712125 - \frac{2925}{373+t},$$

to give f=the elasticity in inches of mercury for temp. Fahr., he gives a table of f for every degree from — 40° to + 360°. by the help of which he compares with his formula, the experiments of Robison, Southern, Dalton, Taylor, Arsberger, Ure, and those of the American Committee, and shows that they differ more widely from each other than from the formula.

Considering the care bestowed to ensure the elasticities being correctly measured, the author is disposed to attribute a great part, if not the whole, of the discordance on the several results, to errors in the measures of temperatures, arising from smallness of scale or incorrectness of division.—*Proceedings of the Royal Society.*

Lond. Edin. & Dub. Phil. Mag.

On the Moist-Bulb Problem. By Captain Shortrede. *Communicated by Lieut. Col. W. H. Sykes, F. R. S.*

The author adopts the notation of Professor Apjohn, and by a similar method deduces the fundamental equation, which is then translated into numbers, taking 1175° F. as the sum of the latent and sensible heats, 0·267 as the specific heat of dry air, the weight of aqueous vapor as five-eighths of that of air, and its specific heat=0·867, that of water being unity.

The coefficient for barometric pressure is resolved into a simple change on the temperature of the air, and consequently also on the depression of the moist bulb; and the equation is put into a shape convenient for use, and shown to be free from objection. The author uses the table of the force of vapor, given in the accompanying preceding paper, and then gives a table of maximum depressions for every degree of the moist bulb, from —40° to 212°, and another table interpolated from it, for every degree of temperature of the air, from 0° to 212°.

Gay-Lussac's depressions are then compared with those of the new formula; and the errors are shown to be almost insensible near the freezing-point, but increasing gradually, till at 25 Cent. it is about 10 per cent. The author attributes these errors to the gradual deterioration of the chloride of lime during the experiments.

The author then compares Prinsep's maximum depressions, collected

and given in vol. v. of the Journal of the Asiatic Society of Bengal. The observed depressions are generally below those given by the new formula, like those of Gay-Lussac. The errors on those where the air was heated by a steam-pipe, are not greater than on those at natural temperatures; and that with air passing through a porcelain tube at an orange heat, falls within the limits assigned by Prinsep in estimating the temperature of the air.

Apjohn's maximum depressions are then compared with the new formula, and here the errors are of an opposite character to those preceding, which the author attributes to the lowering of temperature, occasioned by expansion on escaping from the compression used to force the air in a rapid current through the apparatus. Apjohn's dew-point observations are then compared, and the errors are found to be similar to the preceding, and apparently from the same cause.

To make the formula generally useful, the author gives a table of the depression of dew-point below temperature, for every degree of depression of the moist bulb, at every 5° of temperature from 0° to 100°, and for every 10° from 100° to 140°, which he protracts on a chart, so as to give the dew-point in every case with little more trouble than is required for reading a common thermometer, and also at the same time, the elasticity of vapor in the atmosphere.—*Proceedings of the Royal Society.* Ibid.

Notice of a Theoretical and Practical Treatise on Photography. *By* Dr. Guillot Saguez.

The object of this essay is to remedy the defects in the different methods already published, which only contain a detail of the manipulations, without in any way touching on theory; which, however, if properly explained, would be the means of enabling the operator to improve, perfect, and modify his plans, and make some progress in the photographic art.

It was in trying to satisfy himself as to some of the chemical phenomena that the author made some essential modifications in an operation already too complicated. Thus, to render paper sensitive to light, he now submits it to one or two operations, of which the first is so simple as to scarcely deserve the name of an operation; and, lastly, to fix the positive drawing or impression, the action of hyposulphite of soda has been studied, step by step; as also the effect of its double decomposition.

The theoretical ideas, which the author has expounded, are not merely speculative, but were suggested by an attentive observation of facts during three years of daily experience. The object of the author will be accomplished, if he succeeds, not in making his own conviction pass into the mind of the reader, but in inducing him to search and publish his own observations. The real progress of photographic science is only to be secured by the publication and general diffusion of the varied experiences of careful operators.

To prepare his negative paper, the author recommends the choice

of a white paper of a perfectly even texture; experience having taught him, that with the same intensity of light, and the same preparation, the rapidity of the formation of the picture was in proportion to the fineness of the paper.

Another advantage obtained by this quality of the paper is, that it does not require to be waxed, an operation which always diminishes the effect of the picture.

The sheet of paper is cut about $\frac{1}{4}\frac{3}{8}$ of an inch longer than the ground-glass of the camera-obscura, and is dipped, for from one to three minutes, in a solution of which the following is a formula :—

Iodide of potassium . . .	5 grammes.
Distilled water . . .	120 "

The paper must then be dried, by suspending it in the air for about twelve hours, when it will assume a rosy hue ; this preparation may be made in broad daylight, and will keep several months, provided it is preserved from damp.

When a photographic picture is to be taken, a small quantity of the following liquid is to be poured on a piece of plate-glass, reserved expressly for this purpose, sufficient to slightly moisten the surface of the paper:—

Nitrate of silver	5 grammes.
Acetic acid	10 "
Distilled water	60 "

The action of the azotate of silver in contact with iodide of potassium forms an iodide of silver, white, solid, and easily decomposed by the action of light. The author is very particular about the proportions of the iodine and the silver. If the quantities were equal, the iodide of silver would be little or not at all sensible to light. But if, as he shews, the silver is 1, and the iodine only 0·5, the salt produced will be highly sensitive to the action of light.

For a description of the means employed to bring out and fix the negative image or picture, the reader is referred to the treatise itself. If, however, the processes there given do not differ materially from those already known, the author has so blended theory and practice as to thoroughly explain the action of each substance, and the preference given to the manipulations he mentions.

Preparation of Positive Paper.

A sheet of paper, cut to about the same size as the negative sheet, is laid for a few seconds on the surface of the following solution :—

Chloride of sodium	1 gr. 25
Distilled water	30 "

When the paper is well saturated, it is dried between blotting-paper; and that side of the paper which was in contact with the above-mentioned solution is now laid on the surface of a solution thus composed :—

Azotate of silver . . .	5 grammes.
Distilled water . . .	30 "

It is left on this liquid for some time; after which, it is suspended and dried in a dark room. When quite dry, it can be used, even twenty-four hours after its preparation. However carefully it may have been kept from the sun's rays, it will nevertheless assume a faint rosy tint; so that the lights in the picture will not be equal in brilliancy to the ordinary unprepared paper; for this reason, it is advisable to prepare only as many sheets as are required for the day's use.

Lastly,—follow the details for producing the positive picture, and for fixing it in a solution of

Hyposulphite of soda . . .	5 grammes.
Distilled water	300 "

This salt has a very evident action on chloride of silver, which it dissolves by the prolongation of its action. The hyposulphite of soda is decomposed, and forms sulphuret of silver insensible to light. The fire to which it is necessary to expose each positive picture, to bring it out more clearly, aids this decomposition of the hyposulphite.

A daily experience of some years has proved to the author the advantage of exposing photographic pictures to the fire; and at the same time it has confirmed his opinion of the necessity for combining theory and practice in order to advance the science of photography.

Comptes Rendus. **Lond. Journ. Arts & Sci.**

On Screw Propellers.

Mr. Cowper commenced by an illustration of the law of resistance to a body moving through water. A disk of tin was drawn up from the bottom of a jar of water by one weight hung over a pulley—the time being measured by 20 beats of a pendulum. It was then drawn up in 10 beats (*i. e. twice* the velocity) by *four* weights,—showing the resistance to be as the square of the velocity. The disadvantages of the common paddle-wheel were pointed out, and the various contrivances to obviate them, in the inventions of Buchanan, Oldham, Morgan, Field, Galloway, &c. A general index was given of the various screw propellers of—

Paucton . . .	in 1768	Woodcroft . .	in 1832
Bramah . . .	1795	Smith . . .	1836
Shorter	1802	Ericsson . . .	1836
Fulton . . .	1802	Lowe . . .	1838
Trevithick . . .	1815	Blaxland . . .	1841
Cummerow . .	1828	Buchanan . . .	1841

The general principles of the propeller, and the effect of a variety of forms, were illustrated by causing the propellers to travel along a horizontal wire (about 8 feet long) by giving them a rapid rotation. Woodcroft's propeller was explained. It consists in making the screw with an *increasing pitch*,—the term pitch meaning the distance between the threads of the screw. A screw of uniform pitch is an inclined *plane* wrapped round a cylinder. A screw of increasing pitch is an inclined *curve* wrapped round a cylinder. If the blades of the

propeller are bent so as to be somewhat hollow, this would make an increasing pitch. The experiments proved that a small portion of a blade of uniform pitch did the duty,—the rest of the blade merely following in the wake of the effective portion; but by making the blade with an increasing pitch, each increasing portion overtakes the disturbed water, and so becomes effective. Accordingly, the model, with Woodcroft's increasing pitch, flew along the wire rapidly; but when it was reversed, it would scarcely move. On a large ship a similar experiment was tried,—making a difference of 20 per cent. when the screw was reversed. The Great Britain was fitted with Woodcroft's screw on her last voyage, and there is little doubt propelled the vessel *faster* than the captain was aware. A large diagram was shown (the full size) of the screw fitted to the Blenheim (74), the Oak, and the Termagant (22 guns). The screw consists of two blades. It is 16½ feet in diameter; the blade is 7 feet wide, and the twist or angle of the blade is such that when lying on the ground the upper edge would be 3 feet 4 inches high. The screw is let down through a water-tight well at the stern of the vessel, and can be drawn up out of the water so as to give no impediment when the ship is sailing with a fair wind; and yet the weight of the screw is 6½ tons, and the short iron shaft fixed in its centre 1½ ton,—making together 8 tons. The screw is of gun metal, and worth about £650. H. M. yacht Fairy was fitted with a screw propeller of two blades, 5 feet 4 inches in diameter. She has two engines of 64-horse power each, and her speed is 15½ miles per hour. The Sarah Sands (1300 tons) is one of the best examples of auxiliary steam power. She has two oscillating engines of 180-horse power, driving (by direct action) a Woodcroft screw of four blades and 14 feet diameter. She made the passage to New York in twenty days; while the sailing packets took forty, and has just returned from New York in *fourteen days*, and has frequently made eleven miles in the hour. After the lecture, Mr. Cowper explained the various engines used for driving the screw, and exhibited a large model of improved gearing for those cases in which toothed wheels were employed. The "wave-line" form of vessel recommended by Mr. Scott Russell was also demonstrated by experiment. Lon. Athenæum.

Schafhaeutl's Powder, for rendering Iron malleable, and cleaning it from Sulphur, Phosphorus, and Arsenic.

Schafhaeutl's method of rendering iron malleable, and cleaning it from sulphur, phosphorus, and arsenic, in some parts of Germany, has been employed with tolerable success, and produced favorable results. The method in itself is simple, and the theory appears to be more practical than such experiments in general prove. This powder consists of 1¾ lb. of the peroxide of manganese, 3¾ lbs. of common salt, and 10 ozs. of potter's clay—the clay and the common salt are the most important elements. By the heat of the puddle oven, the salt mixed with the clay is decomposed. The natrium, either on account of the air, or the peroxide of manganese, attaches itself to the oxygen, and changes to natron, which, with the argillaceous and quart-

zose earth, forms itself into a silicate, or aluminate, of natron, and goes in the slag. The peroxide of manganese loses a great quantity of its oxygen, and forms itself as oxide of manganese with the silicious earth (from the silicum of the pig-iron) to a silicate, and prevents the loss of the metal. This free chlorine, which, with constant stirring, is brought to bear on the mass, attaches itself to the sulphur, phosphorus, or arsenic, and makes combinations, which are carried out of the furnace through the grate. From this it will be seen, that this method not only cleanses the iron, but shortens considerably the process of rendering it malleable. The quantity of peroxide of manganese can be considerably diminished when it is worked in open hearths, as in some places in Germany. It was endeavored to introduce this method in iron smelting by cupola furnaces, but, on account of various reasons, it could not be carried into execution. It was proposed to employ sal-ammoniac instead of salt; the chlorine in sal-ammoniac is double the quantity of that contained in an equal weight of salt. No clay is required, it does not increase the slags, and the quantity of hydrogen gas in sal-ammoniac (7 or 8 per cent.) contributes much to the cleansing of the iron. The expensive cost of the sal-ammoniac has prevented its employment on a large scale. **London Mining Journal.**

Analysis of Moulding Sand.

A correspondent of the *Mining Journal* forwards the results of four analyses of moulding sand, by Herr Kaupmann, of the laboratory of the Royal Institution at Berlin, from which it appears that, in widely different localities, the best article is remarkably alike in composition, and that it may be artificially produced, by mixing about 93 parts of silicious earth, or quartzose sand, with 2 parts of oxide of iron, and 5 of clayey or argillaceous earth, as free as possible from lime. These proportions he particularly recommends for the casting of statues, &c. **London Builder.**

Experiments to ascertain whether the mixture of Zinc with Iron in its manufacture, is injurious to the Iron or otherwise. By JAMES NASMYTH.

SIR,—Under the impression that it may be interesting to some of your readers, I send you the results of an investigation which has been lately made, at the desire of the Lords of the Admiralty, by their "Committee on Metals," for the purpose of ascertaining whether the adoption of the process of galvanizing wrought-iron, by chemical coating of metallic zinc, had any prejudicial effect in preventing such galvanized articles from being re-manufactured, in the event of such becoming obsolete, as in the case of working up old or scrap iron. With a view to put this question to the test of experiment in the most severe manner, a piece of *galvanized iron wire rope* was welded up into a bar, and put to the most severe test. In the first place it was found, that although the iron-wire was quite covered with metallic

zinc, which, although partially driven off in the process of welding, yet, so far from the presence of the metal, or its oxide, presenting any impediment to the welding of the iron, (as in the case of lead,) the iron-wire welded with remarkable ease; and the result was, a bar of remarkably tough, silvery-grained iron, which stood punching, splitting, twisting, and bending, in a manner such as to show, that the iron was not only excellent, but to all appearance, actually improved in quality in a very important degree.

Encouraged by such a result, a still further, and even more severe, trial was made—viz.: by welding up a pile of clippings of galvanised iron-plates, or sheet-iron, covered with zinc, as in the former experiments. The presence of the zinc appeared to offer no impediment to the welding, and the result was, a bloom or bar of iron—the fracture of which presented a most remarkable and beautiful silvery grain—as good, if not superior, in aspect, to the very finest samples of "Low Moor" or "Bowling" iron. Blooms of this iron were rolled out into rods, and tested in the cable-proving machine, and the result indicated from 5 to 10 per cent. higher strength than the best samples of wrought-iron—thus establishing the fact, that so far from the presence of zinc being destructive to the strength and tenacity of wrought-iron, the contrary is the case.

I may mention, that bars of iron were heated to a welding heat, prepared by Scarf for sheathing, in the usual manner; and, on drawing them from the fire, for being welded, a handful of zinc filings was thrown on the welding hot surface, and the welding proceeded with; in this severe test no apparent impediment to the process resulted; the iron welded as well as if no zinc had been present. Judging from the appearance of the iron welded up from "zinc covered iron scraps," not only as respects its clear silvery aspect, but also the increased strength, which such exhibited under proof, it may not be unreasonable to infer, that some important improvement might be made in the manufacture of iron by the actual introduction of metallic zinc in some one or other of the stages of its manufacture—such as in the puddling-furnace. What the nature of the action of the zinc is, we are not yet able to say; all we as yet know is, that, so far from being prejudicial to the quality of the iron, it appears to have rather an improving effect; and that to such an extent as to cause us to desire that the subject may receive the attention of some of our intelligent iron manufacturers, so as to put the matter to the test of actual experiment in the puddling-furnace, or any other stage of the process, such as may appear to promise the best results. This, however, can only be viewed as a suggestion; but it appears to me to be a subject well worthy of attention—and for that reason alone I have taken the liberty to lay the matter before your readers; for, as being the result of the experiments conducted for the public good, the public are entitled to the result.

I may name a curious corroborative fact, that the strongest cast-iron made in Belgium, and selected for the casting of guns, is made from an iron ore, in which the *ore of zinc* forms a considerable portion. Whether the superiority of this iron is due to the presence of zinc, is

a question; but the result of the before-named experiments tend to lead to the supposition, that such may be the case.

Bridgewater Foundry, Patricroft, near Manchester, May 10.

Lond. Min. Journ.

Paper-hangings prepared by means of Nitrate of Silver and other Salts.

M. Larocque presented a paper to the *Academie des Sciences*, Paris, explaining a new process for coloring and designing paper-hangings. He observes, that nearly all the salts are volatilized under the influence of vapor from water or saline solutions, and that the nitrate of silver, among other salts, on account of its easy reduction, would furnish a great variety of shades of color; and by means of reserves made in the paper, any designs in white might be obtained. The following is the process employed:—Take of pure nitric acid, sp. gr. 1·50, two parts; and distilled water, one part. Place the mixture in a porcelain capsule and heat it, throw in about two ounces of silver, and continue to apply heat until the action of the acid on the metal has ceased; with this quantity of silver 700 or 800 sheets of paper may be colored. In this operation but a very small loss of silver will be found, for the residue can be formed into nitrate of silver and sold; or, if calcined at a red heat in a crucible with carbonate of soda, the metallic silver may be obtained and employed for a new operation. In order to obtain good designs, it is necessary to operate in a place well lighted and out of currents of air. Civ. Eng. & Arch. Journ.

Improvement in the Safety Lamp.

At a recent meeting of the Geological and Polytechnic Society of the West Riding of Yorkshire, the Rev. W. Thorp produced a new lamp which will remedy all the defects in the lamp of Sir H. Davy; affording five times more light, and being, it is said, safe in every condition of the coal mine. In order to obtain more light, the Rev. W. Thorp introduces the solar burner, characterized by the circular wick, and the air admitted through its centre from the bottom of the lamp, protected of course by gauzes of wire. Connected with this part is an adjustment, placed outside of the cistern, by which the wick can be raised or lowered. Over the light is applied a chimney of iron, based with a few inches of glass, with air admitted to supply the exterior of the flame from the inside of the lamp. This is so fixed that it cannot be broken from the ordinary falls to which these lamps are liable to be exposed. Having obtained a much higher illuminating power than that generally used by miners, the next object being to ensure perfect safety in every condition of the mine, there are inserted into the chimney four or five chambers of wire gauze, so that the flame of ignited gas has to traverse eight or ten meshes before it can possibly reach the exterior fire-damp; but as one mesh, as in the old lamp, is safe unless exposed to a current, and as no lateral current of gas or air can be exerted upon the flame on account of the chimney

the lamp is perfectly safe. And it is found, by any artificial means, utterly impossible to pass flame through these chambers of gauze, so that it appears to be quite safe under every circumstance and condition of the mine. There are other advantages over the Davy lamp of no inconsiderable value:—1. It requires trimming only once a week; 2. The oil does not fall out if laid on one side; 3. It is much more easily cleaned; 4. The cheapest oil can be used in it. As no patent will be taken out for the new lamp, and the whole of the improvement is generously given to those interested in collieries, the Rev. W. Thorp expresses an earnest wish that all lamps may be purchased of Mr. W. Ramsden, of Wakefield, through whose assistance he has been enabled to produce the lamp. London Athenæum.

Copper-wire Cord for Window-Sash-Lines, &c.

Messrs. Newall & Co. have greatly improved their patent copper wire cord, which is now made extremely flexible, and is well adapted for window-sash-line, hot-houses, lightning conductors, picture-cord, clock-cord, bell-hanging, and many other purposes for which hempen rope has hitherto been used; the advantages being that it is cheaper, much more durable, and one-sixth part the bulk of hempen rope.

Civ. Eng. & Arch. Journ.

BIBLIOGRAPHICAL NOTICES.

Statistics of Coal, &c., &c. Prepared by Richard Cowling Taylor. *Philadelphia: J. W. Moore*, 1848.

Mr. Taylor, the author of this book, has long been known as a most assiduous and pains-taking geologist, to whose laborious and minutely accurate investigations we owe much of our knowledge, especially of our Pennsylvania coal fields. His unpretending modesty, and readiness to yield to others, has prevented his name from being as well known to the public as those of others, but we doubt, whether, in the whole list of those who have devoted themselves to American Geology, there is one of more solid acquirement, and more profound judgment a more accurate observer, or more indefatigable laborer, than Mr. Taylor. As President of the Dauphin Coal Company, it was his duty to watch the progress of mining industry, and we knew that he was in possession of a great mass of statistical facts upon this subject.—When, therefore, it was first announced that he was about to publish a work upon this subject, our expectations were highly excited, and we should have been deeply disappointed, if we had found the proposed volume of only moderate value; yet we confess that we were in no wise prepared for such an extensive and elaborate digest of important information, as that which he has presented. We would scarcely have thought it possible, that one individual, especially in this country, where the facilities for such a purpose are so few, and with

other and laborious duties daily pressing upon him, should have collected together such a mass of facts, and made of them so well arranged, and so delightful a book. And now that, for about the twentieth time, we take it up to look over its contents, and read an occasional chapter, our astonishment is in no degree abated at the extent and variety of the information which it affords; for this work is by no means confined to the development of mere tabular statements of the production of this important fuel, in various countries, but embraces within it every kind of information which those interested in this subject would be likely to seek. The geology of coal fields—the various fossils which characterize them—the mode of sinking, and of working the mines—the precautions taken to secure the health and lives of the miners; in short, every matter which is of importance to those engaged in mining projects, or interesting to the general reader, are here considered. Nor is it confined to the study of coal only, but embraces all those fossil productions which bear an analogy to it—brown coal, peat, bitumen—and even the statistics of wood, as a fuel, have a place in its pages; and the reader will find, moreover, much valuable information on the subject of the manufacture of iron, a subject which the author justly observes, is "so interwoven with matters essential to our main subject, that a considerable mass of information has been necessarily incorporated in our pages."

The method in which these various subjects are treated, is worthy of their extent and importance. The style is perfectly plain and unpretending. Great care has evidently been taken to acknowledge the labors of those from whom the information was obtained. The work is properly and judiciously illustrated by maps and diagrams, and we especially recommend to the notice of our readers, the ingenious and striking method of presenting comparative results, by proportional square areas.

We cannot do more than notice this book at present. We hope, when we have had time to give it the study which it deserves, to recall the attention of the public to it, in a more extended review, and we shall, by the permission of the author and publisher, treat our readers, from time to time, with some of its valuable information.

We take our leave of it, for the present, with the sincere hope, that its publication may prove as profitable to the author, as it undoubtedly will be to the public. F.

We have received a note from Prof. W. R. Johnson, the American editor of Knapp's Chemical Technology, requesting us to republish the article upon the cost of manufacturing illuminating gas, in our Journal, in order that our readers may certainly know how far our criticisms upon Prof. J. are well founded. We have given already the reasons why we do not believe our Journal to be the proper vehicle, either for personal accusations against the persons in charge of the Philadelphia Gas Works, or for their defence against such accusa-

tions; we must, therefore decline acceding to Prof. Johnson's request. We have already said that, as the citizens of Philadelphia are those who are most interested in the truth or falsehood of these charges, the most of which have no scientific bearing whatever, it is in the daily press of our city that the discussion ought to be carried on, and if the charges find their way into the newspapers, the friends of the parties concerned will, we have no doubt, reply, and the truth will be developed. But the questions, whether the Superintendent of the Philadelphia Gas Works has, or has not, "a direct or indirect interest in keeping up the price of gas;" or if he has such, whether it influences him against the adoption of proper improvements; and whether he does, or does not, "surround the subject of gas making with mystery," and other questions of this nature, we again most respectfully suggest to Prof. Johnson, have no appropriate place in our Journal, nor do we think they have in his edition of Knapp's Chemical Technology.

COM. PUB.

FRANKLIN INSTITUTE.

COMMITTEE ON SCIENCE AND THE ARTS.

Report on A. G. HECKROTTE's *Self-Acting Safety Coupling for Rail road Cars.*

The Committee on Science and the Arts, constituted by the Franklin Institute of the State of Pennsylvania for the promotion of the Mechanic Arts, to whom was referred for examination the self-acting safety coupling for railroad cars, invented by A. G. HECKROTTE, Washington city, D. C.,

REPORT—

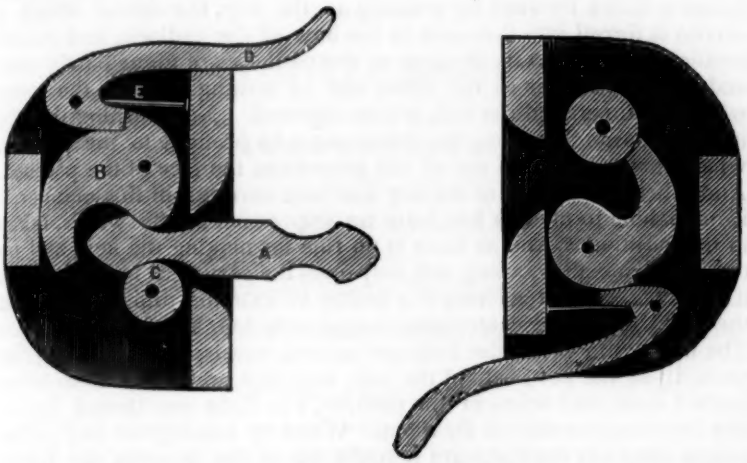
The apparatus consists of a flat box, figs. 1 and 2, containing the necessary arrangements for securing the head of the coupling bar A, which is received in an opening by guides which are constructed with a sufficient flare to allow of its entrance at any angle at which it would be likely to be presented. The bar on its entrance, finds itself opposed by a disk or friction roller. C, on one side and a tumbler, B, of peculiar shape on the other; a slight revolution of each of these allows the head of the bar to pass, until, in revolving, a notch on the tumbler is caught by a trigger, D, arranged for the purpose, and which prevents the bar, when acted upon by traction, from being drawn from the box. The trigger is allowed to extend beyond the box and front of the car, so that, when the train is brought into such a position as to endanger the passage of a car by being thrown too obliquely one to another, the trigger is acted upon by the front of the car preceding and the coupling is immediately disengaged.

The arrangement of the apparatus is such that the cars are coupled instantly by merely running them together, and the fastening is completed without any farther intervention; in this the chief merit of the invention consists; it also has the important advantage of permitting

the cars to be uncoupled at will, even when all the couplings are tightly strained, which cannot be done by the usual arrangement.

The committee are convinced of the great utility of Mr. Heckrotte's invention in the coupling and uncoupling of cars in a neat and effective manner, with much less danger to life and limb than the ordinary method.

The statistics in possession of the committee are not sufficient to assure them that the immediate uncoupling of cars in motion is more likely to prevent accidents than the retaining them together; there are facts enough, however, in which the lives of passengers have been saved by the continuity of the train being preserved, to warrant a doubt as to this question.



Mr. Heckrotte has a very ingenious and neat method of constructing the tumbler, the shape of which requires great nicety in its formation; a plan of this is shown in the drawing accompanying the report.

By order of the Committee,

WILLIAM HAMILTON, *Actuary.*

June 8th, 1848.

Report on MR. S. COLTON'S *Improved Door and Pad-locks.*

The Committee on Science and the Arts, constituted by the Franklin Institute of the State of Pennsylvania for the promotion of the Mechanic Arts, to whom was referred for examination an improvement in Door and Pad-locks, invented by Sabin Colton, of the City of Philadelphia, Pennsylvania,

REPORT—

That the peculiarity of Mr. Colton's locks is this:—Three circular metal disks are placed in a frame having three grooves cut in it of the proper size, in which the disks turn freely and independently on the same axis. This frame carries the detent or catch

which holds the bow in the case of the padlock, and is thrust back by means of a spring when unlocked. The circular disks project above the frame which carries them, and in one position, the projecting parts are cut down even with the frame, so as to allow it to move backwards and forwards freely in the lock. Each disk has a hole or slot drilled into it, to which a projecting point from the key fits, and it is so constructed that when the key is turned in a given direction, the disks can be brought to the position where they do not project above the frame; but if it is turned in the contrary direction, they can never be brought to this position, owing to the manner in which the slots are cut in the disks. On the inner side of one of the faces of the padlock, three grooves are cut, into which the disks will fit. When the frame is thrust forward by pressing on the key, the detent which it carries is forced into the catch in the bow of the padlock, and in this position the grooves on the face of the padlock are immediately over and in the same line as the disks, and by turning the key the latter will enter them, and the lock is then fastened. Now turning the key in the opposite direction, the disks cannot be brought to the position where they all shall be out of the grooves on the face of the padlock. And when the motion of the key has been reversed in this manner, it is impossible to make a key from an impression of the wards, taken in this position. And as there is no rule for making the key, and no two are made alike, a key will only open the particular lock for which it is made. Thus rendering it a matter of extreme difficulty to pick the lock. The same contrivance is applied to door and fire proof locks. The frame into which the disks are inserted is caused to slide down (by pressing on the key) behind the bolt, and thus prevents it from being pushed back, and when in this position, the disks are turned by the key into the grooves cut for them. When by turning the key in the proper direction the disks are brought out of the grooves, the frame is caused to fly up by means of springs, and the bolt may be pushed back, and the door unlocked. The bolt is moved backwards and forwards by means of a handle like the ordinary locks of doors. And this is a great advantage in Mr. Colton's lock, that the sliding of the bolt is independent of the arrangement for locking it, thus diminishing the size and friction of the parts which the key has to turn, and allowing the key to be made of a small and convenient size. The keys of Mr. Colton's fire proof locks are very little larger than the ordinary brass dead-latch key. From the form of the wards and the key hole it is not an easy matter to blow the lock to pieces by gunpowder, as the charge would be blown out of the key hole before it would break the lock.

The Committee have only further to remark that Mr. Colton's locks are characterized by simplicity of arrangement and construction, and are not liable to get out of repair. They are a useful invention and an improvement over the ordinary form of locks, attaining all the advantages of the most complicated construction.

By order of the Committee,

WILLIAM HAMILTON, *Actuary*.

June 8th, 1848.

JOURNAL

OF

THE FRANKLIN INSTITUTE

OF THE STATE OF PENNSYLVANIA

FOR THE

PROMOTION OF THE MECHANIC ARTS.

AUGUST, 1848.

CIVIL ENGINEERING.

The General Railroad Law of the State of New York.

An Act to authorize the formation of Railroad Corporations. [Passed March 27, 1848.]

(Continued from page 13.)

Sec. 21. In case any married woman, infant, idiot or insane person, or any unknown owner, or owners not personally notified to appear, and who shall not appear after such notice on the appointment of commissioners, shall be interested in any such lands, real estate and property, the court shall appoint some proper person to appear before the said commissioners and act as attorney for and in behalf of such married woman, infant, idiot, insane person, unknown owner or non-appearing owner, not personally served with notice.

Sec. 22. If at any time after the location of the track of said road, in whole or in part, and the filing of the map thereof, it shall appear to the directors of the said company, that the line in some parts thereof may be improved, it shall be lawful for the said directors from time to time to alter the line, and cause a new map to be filed in the office where the map shewing the first location is or shall be filed, and may thereupon proceed to take possession of the lands embraced in such new location, that may be required for the construction and maintenance of said road on such new line, and the convenient accommodations appertaining to the same, and acquire the same either by agreement with the owner or owners, or by such proceedings, as near as may be, as are authorised under the preceding sections of this act, and use the same in place of the line for which the new line is substituted.

Sec. 23. Whenever the track of said railroad shall cross a railroad